Five-Year Review Report

Sangamo-Weston, Inc./Twelve Mile Creek/ Lake Hartwell PCB Contamination Superfund Site

Part 2

Operable Unit Two (OU-2), Pickens, Pickens County, South Carolina

November 2009

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NRT	Natural Resource Trustees
O&M	operations and maintenance
OU-1	Operable Unit One
OU-2	Operable Unit Two
PCB	polychlorinated biphenyl
RA	Remedial Action
RI	Remedial Investigation

serum PCB levels. SC DHEC and ATSDR concluded that blood levels for participants in the blood testing were comparable to the general US population. It is important to note that heavy fish consumers were not tested during this study, but human health risks are considered minimal for people that eat small to moderate amounts of fish.

The annual aquatic biota and sediment monitoring program has been implemented annually in the spring of each year since 1994. Three phases of additional investigations were conducted by USEPA's National Risk Management Research Laboratory (NRMRL) and National Exposure Research Laboratory (NERL) to gain a better understanding of natural mechanisms that contribute to the recovery of PCB-contaminated sediments. Data from these investigations indicate that surficial sediment PCB concentrations in the Twelve Mile Creek Arm of Lake Hartwell have decreased steadily due to physical processes such burial, mixing/dispersion, and PCB dechlorination. Sediment age dating indicates that the majority of surficial sediments in the Twelve Mile Creek Arm of Lake Hartwell will reach the 1 mg/kg clean-up goal between 2007 and 2011. Sediment concentrations in 2008 ranged from non-detect to approximately 3 mg/kg. However, largemouth bass, channel catfish, and hybrid bass PCB concentrations have not responded measurable to the decreased surface sediment trends.

PCB concentrations in largemouth bass in the Twelve Mile Creek and Seneca River Arms of Lake Hartwell continue to be above the 2.0 mg/kg Food and Drug Administration (FDA) limit, although channel catfish from these stations dropped below the 2.0 mg/kg limit in 1999 and have remained near that level at most locations. PCB concentrations in hybrid bass remain greater than 2.0 mg/kg at all six stations in Lake Hartwell.

After several iterations of evaluating effective sediment management plans for the three Twelve Mile Creek impoundments, USEPA proposed installing high-flow sluice gates on the downstream side of the Woodside 1 and Woodside 2 impoundments to facilitate downstream transport of sediments to the Twelve Mile Creek Arm of Lake Hartwell. However, the Natural Resource Trustees (NRT) and Schlumberger Technology Corporation (STC; responsible party) have reached a technical agreement in principle that would, among other items, involve removal of the Woodside 1 and Woodside 2 dams with subsequent stream restoration for an approximate 10,000 foot reach of Twelve Mile Creek. USEPA fully supports the dam removal concepts envisioned in the Natural Resource Damage Assessment (NRDA) settlement as it represents the most permanent solution to ensuring natural sediment transport downstream to the Twelve Mile Creek Arm of Lake Hartwell. The Natural Resource Damage Settlement Consent Decree for OU-2 was issued in May 2006. Dam removal activities were recently ordered to be expedited and are anticipated to occur during the next five year period. An Explanation of Significant Differences (ESD) was issued on September 3, 2009 for OU-2 to document a change to the June 1994 ROD. The ESD documents settlement requirements which

serum PCB levels. SC DHEC and ATSDR concluded that blood levels for participants in the blood testing were comparable to the general US population. It is important to note that heavy fish consumers were not tested during this study, but human health risks are considered minimal for people that eat small to moderate amounts of fish.

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include restoration and compensation for alleged injuries to natural resources due to PCB exposure and for alleged lost recreational fishing use due to fish consumption advisories. Ecological restoration projects include removal of the lower two hydroelectric impoundments on Twelve Mile Creek know as Woodside 1 and Woodside 2 and stream corridor restoration.

The remedy at OU 2 currently protects human health and the environment because is considered adequately protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future. Remedial technologies for accelerating cleanup at the Plant Site portion of OU-1 areas will be implemented in the near future for the Plant Site. Since operation and maintenance of these systems will be optimized to meet established performance standards, this site is considered adequately protective of human health and the environment. However, for the remedy to be protective in the long-term, the following actions need to be taken:

- Dam removal and stream restoration activities at OU-2.
- Evaluation of remedial technologies for accelerating cleanup at Plant Site portion of OU-1 to evaluate the potential for a groundwater to surface water exposure pathway.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Sangamo Weston/Twelve Mile Creek/Lake Hartwell – Operable Unit Two		
USEPA ID (from WasteLAN): SCD003354412		
Region: 04	**State:** SC	**City/County:** Pickens/Pickens

SITE STATUS	
NPL STATUS: ☒ Final ☐ Deleted ☐ Other (specify)	
Remediation Status (choose all that apply): ☒ Under Construction ☒ Operating ☒ Complete	
Multiple OUs? ☒ Yes ☐ No	**Construction completion date:** 08/09/1999
Has site been put into reuse? ☐ Yes ☐ No N/A (Note: site is primarily lake and river environment)	

REVIEW STATUS	
Lead agency: ☒ USEPA ☐ State ☐ Tribe ☐ Other Federal Agency _____	
Author name: Craig Zeller, P.E.	
Author title: Remedial Project Manager (RPM)	**Author affiliation:** USEPA, Region 4
Review period: 03/03/09 to 09/31/09	
Date(s) of site inspection: 05/06/09	
Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion	
Review number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)_____	
Triggering action: ☐ Actual RA Onsite Construction at OU #__ ☐ Actual RA Start at OU #__ ☐ Construction Completion ☒ Previous Five-Year Review (FYR) Report ☐ Other (specify)	
Triggering action date (from WasteLAN): 09/21/2004	
Due date (five years after triggering action date): 09/21/09	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the FYR in WasteLAN.]

Five-Year Review Summary Form (continued)

Issues:

- Source Control of groundwater to surface water pathway at OU-1/OU-2 interface,
- Dam removal and stream restoration activities in OU-2

Recommendations and Follow-up Actions:

Maintain current fish consumption advisory. Continue annual monitoring of aquatic biota and sediments with approved workplan. Monitor progress of Natural Resource Damage Settlement between NRTs and STC (PRP) regarding Woodside 1 and Woodside 2 dam removal and stream restoration along Twelve Mile Creek corridor.

Protectiveness Statement(s):

The MNR/Institutional Controls remedy for OU-2 is considered adequately protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future

However, in order for the remedy to be protective in the long-term, the following actions need to be taken :

- Dam removal and stream restoration activities at OU-2.
- Evaluation of remedial technologies for accelerating cleanup at Plant Site portion of OU-1 to evaluate the potential for a groundwater to surface water exposure pathway.

Other Comments::

Section 1
Introduction

1.1 The Purpose of the Review

The purpose of FYRs is to determine whether the remedy at a site is or is expected to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and recommendations to address them.

1.2 Authority for Conducting the Five-Year Review

The Agency is preparing this FYR pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Contingency Plan (NCP). CERCLA Section 121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

1.3 Who Conducted the Five-Year Review

USEPA Region 4 has conducted a FYR of the MNR remedy for Sangamo OU-2 in Pickens County, South Carolina. This review was conducted from March 2009 through August 2009. A visit to the site was completed on May 6, 2009. This report documents the results of the review.

1.4 Other Review Characteristics

This is the second statutory FYR for OU-2. The triggering action for this review is the Previous FYR, which was approved on September 21, 2004. The FYR is required statutorily because PCBs contamination remains in sediments and aquatic biota that does not allow for unlimited use and restricted exposure.

The second FYR for OU-1 has been conducted concurrently with OU-2 review and is documented in Part 1, submitted concurrently with this report.

Section 2
Site Chronology

Table 1 identifies key site events and relevant dates in the site chronology. The identified events are illustrative, not comprehensive.

Table 1
Chronology of Site Events

EVENT	DATE
Discovery and Site Inspection	September 1985
Preliminary Assessment	March 1986
Proposed to National Priorities List (NPL)	January 1987
Final Listing on NPL	February 1990
Remedial Investigation/Feasibility Study (RI/FS) Special Notice to STC	April 1990
Fund-Lead RI/FS	September 1990 to April 1994
OU-2 ROD	June 1994
Trash-rack Rakes Installed at Woodside 1/Woodside 2 Impoundments to Facilitate Downstream Passage of Sediments	June 1994
Annual Monitoring of Aquatic Biota/Sediments	April/May since 1995
Trash-rack Rakes Not Performing as Expected	September 1997
Initial Sediment Management Alternative Evaluation for Twelve Mile Creek Impoundments	September 1997 to March 1998
Public Education Program and Issuance of a Joint, Risk-based Fish Consumption Advisory by States of South Carolina and Georgia	July 1998
Initial Sediment Dredging at Woodside 1/Woodside 2 Impoundments	October 1998
Remedial Design Complete/Remedial Action (RA) Begins	October 1998
Second Sediment Dredging at Woodside 1/Woodside 2 Impoundments	July 1999
Preliminary Close-Out Report	August 1999
Data Collection for Sediment Transport Modeling	December 1999
High Flow Sluice Gate Installation Evaluation	January 2000
Sediment Transport Modeling and Second Sediment Management Alternative Evaluation for Twelve Mile Creek Impoundments Completed	April 2000
Public Education Telephone Interviews Completed	July 2000

Table 1
Chronology of Site Events

EVENT	DATE
Third Sediment Dredging at Woodside 1/Woodside 2 Impoundments	January 2001
Phase 1 MNR Investigation Report Completed by USEPA – ORD	September 2001
Fourth (and last to date) Sediment Dredging at Woodside 1/Woodside 2 Impoundments	February 2002
Final Phase 2 MNR Investigation Report Completed by USEPA – ORD	June 2002
Interim RA Report	September 2002
Second Data Collection Effort for Sediment Transport Modeling	November 2002
Sediment Transport Modeling and Morphology Evaluation to Evaluate In-stream Impacts From Dam Removal	April 2003
Draft Phase 3 MNR Investigation Report completed by USEPA – ORD	April 2003
Final Health Consultation Regarding Lake Hartwell Fish Consumption	July 2004
First FYR Report for OU-2	September 2004
NRT and STC negotiations Took Place Over a Natural Resource Damage Assessment and Settlement	2004
Fish Advisory Signs Installed	April 2009
Expedited Order for Dam Removal	2009
ESD issued by USEPA	September 2009

Section 3
Background

This section of the FYR report provides a brief site background and description of the site characteristics.

3.1 Physical Characteristics

The Sangamo OU-2 site is located in Pickens County, South Carolina. The Sangamo OU-2 site comprises the sediment, surface water, and biological migration routes downstream from the Sangamo Weston Plant and satellite disposal areas that have site-related PCB-contamination. The Sangamo Weston Plant and satellite disposal areas constitute OU-1 of the site. Lake Hartwell was constructed by the Savannah District United States Army Corps of Engineers (USACE) between 1955 and 1963 by damming the Savannah, Seneca, and Tugaloo Rivers. The 56,000 acre Hartwell Reservoir is located on the Georgia-South Carolina border. The OU-2 study area includes approximately 40 stream miles of Twelve Mile Creek and its tributaries, the Twelve Mile Creek Arm of Lake Hartwell, and portions of the Keowee and Seneca River Arms of Lake Hartwell down to the Route 37 (Rt. 37) bridge just south of Clemson, South Carolina. The primary focus of OU-2 is centered on this area; however, samples were collected throughout Lake Hartwell during the OU-2 investigations including that portion of the reservoir between Rt. 37 and Hartwell Dam.

The Twelve Mile Creek watershed has an area of 140 square miles and includes first-, second-, third- and fourth-order streams. The tributaries to Twelve Mile Creek are predominantly first- and second-order streams. Twelve Mile Creek is a third order stream above the mouth of Town Creek; below this point, Twelve Mile Creek is a fourth-order stream. Twelve Mile Creek is the longest stream segment in the watershed, which flows southward for approximately 24 miles until reaching the headwaters of Hartwell Lake. Within this 24-mile reach, approximately 80 tributaries flow into Twelve Mile Creek. The bulk of the stream flow is derived from runoff. Sediment in the creek is composed primarily of sand and has a low total organic carbon content throughout the majority of the streambed.

Surface water in the Twelve Mile Creek basin is currently utilized for drinking water supply, fishing, and industrial uses. Twelve Mile Creek is classified as a Class B stream according to South Carolina Regulations *(Regulation 61-68, Water Classifications and Standards)*. Under the regulations, Class B waters are defined as being suitable for secondary-contact recreation (fishing, boating, wading) and drinking water supply (assuming conventional treatment methods are used) as well as both agricultural and industrial uses.

The three impoundments on the lower section of Twelve Mile Creek are all of masonry construction. The lowermost impoundment (Woodside 2) is the largest of the three. This impoundment was built in 1905. The middle impoundment (Woodside 1) is located in the community of Cateechee and was rebuilt in 1937 after it failed in 1934. The third, or uppermost, impoundment was built in 1926 and is the smallest of the three impoundments. This upper impoundment was formerly used by the Easley-Central (E-C) Water District as a drinking water source.

Hartwell Lake is an impoundment with a drainage basin 2,088 square miles. Hartwell Lake is managed by the USACE for flood control and electric power generation, both of which are affected by the storage capacity of the reservoir, which is 2,550,000 acre-feet of water (equivalent to 830 billion gallons). Since its construction, the reservoir has become one of the major recreational lakes in the Southeast. Current management practices therefore consider recreational benefits as well as flood control and power generation. The lake is drawn down in the fall in anticipation of the increased rainfall that the area usually receives during the winter and spring.

Lake Hartwell is Class A surface water (South Carolina regulations) suitable for primary contact recreation (swimming, waterskiing), secondary contact recreation (fishing, boating, wading), drinking water supply, and agricultural/industrial uses. The lake currently receives a significant level of point and nonpoint source discharges. National Pollutant Discharge Elimination System (NPDES) permitted discharges include industrial facilities, electric power generating stations, and various sewage treatment plants. Since the reservoir continues to be a source of potable water for a number of communities, these discharges apparently have not had an appreciable impact on water quality in the lake.

3.2 Land and Resource Use

Demographics and land use in the Hartwell Lake area are variable, with small towns and rural residential development in the Twelve Mile Creek watershed giving way to larger towns and more concentrated development in the areas surrounding Hartwell Lake. According to 2000 census data, approximately 110,757 people live in Pickens County, South Carolina. The major community in the upper portion of the Twelve Mile Creek watershed is the town of Pickens, which had an estimated population of 3012 in 2000. The town of Clemson, with an estimated 2000 population of 11,939, is the only large community directly on the shoreline of the lake. Outside of the small towns and communities, the majority of the Twelve Mile Creek watershed (and Pickens County in general) is undeveloped. Most of the acreage bordering Twelve Mile Creek and its tributaries is either forested or cleared for agricultural purposes. The entire Hartwell project, both land and water usage, is managed by the USACE Savannah District.

Development along the shoreline of Lake Hartwell is at least partially controlled through the USACE Lakeshore Management Plan. Surface water supplies the bulk of potable water utilized by the residents of Pickens County and surrounding areas.

3.3 History of Contamination

Sangamo Weston manufactured electrolytic mica and power factor capacitors at the Pickens, South Carolina plant from 1955 to 1987. The plant used a variety of dielectric fluids in the manufacturing processes, including fluids that contained PCBs. Waste disposal practices included land burial of off-specifications capacitors and wastewater treatment sludge on the Plant Site and six satellite disposal areas. PCBs were discharged with effluent directly into Town Creek, a tributary of Twelve Mile Creek, which is in turn a major tributary of Lake Hartwell. Lake Hartwell was created between 1955 and 1963 when Hartwell Dam was constructed by the USACE on the upper Savannah River. At the normal pool level of 660 feet mean sea level (msl), Lake Hartwell is 56,003 acres in size with a shoreline, of 962 miles.

Between 1955 and 1977, the average quantity of PCBs received and used at the plant ranged from 700, 000 to 2,000,000 pounds per year (lbs/yr). An estimated 3 percent of the quantities received and used at the plant were discharged to Town Creek, resulting in an estimated cumulative discharge of over 400,000 lbs of PCBs. An unspecified amount was buried at the six satellite disposal areas and the Plant Site. PCB use was terminated at the plant in 1977, prior to an USEPA ban of its use in January 1970. A fish consumption advisory for Lake Hartwell was first instituted in 1976. This advisory has been modified many times, and remains in effect.

The Sangamo site was proposed to the NPL in January 1987, and became Final on the NPL in February 1990. The site was divided into two operable units. OU-1 addressed the land-based source areas which included the Plant Site and six satellite disposal areas and contaminated groundwater associated with the land based source areas. OU-2 addressed the sediment, surface water, and biological migration pathways downstream from the source areas. Construction completion was achieved for the OU-1 portion of the Sangamo site in August 1999. In general, the clean-up activities at OU-1 involved excavation of PCB-impacted material at the Sangamo Plant and the satellite dump sites, followed by temporary staging on the plant property. Approximately 60,000 tons (*e.g.*, 40,000 cubic yards) of PCB-impacted material was treated via thermal desorption on the plant property from December 1995 through May 1997. Active groundwater recovery and treatment for PCBs and volatile organics continues at the Plant Site and one satellite dump site known as the Breazeale Site.

As a result of a merger with Sangamo Weston in 1989, the responsible party for the Sangamo site is STC whose USA headquarters is in Houston, Texas. STC performed the RA at OU-1 pursuant to the terms of a Consent Decree with USEPA. USEPA issued a Special Notice Letter

to STC in April 1990 which offered them the opportunity to conduct an enforcement lead RI/FS for OU-2. STC declined this offer, and USEPA conducted a Fund-Lead RI/FS for OU-2 from September 1990 through April 1994.

A comprehensive discussion and presentation of the RI/FS findings and conclusions can be found in the RI/FS documents and the June 1994 ROD. In general, approximately 730 acres of sediments in the Twelve Mile Creek Arm of Lake Hartwell had PCB concentrations greater than the selected clean-up goal of 1 mg/kg. The Twelve Mile Creek Arm of Lake Hartwell is generally described as the reach between the Highway 227 Bridge (*e.g.*, Maw Bridge) and the Highway 123 Bridge near Clemson. Within the Twelve Mile Creek watershed, minor levels of PCB contamination have persisted in Town Creek near the Sangamo discharge point, and in sediments trapped behind the 3 small dams on Twelve Mile Creek (*e.g.*, see discussion in Section 4). The Twelve Mile Creek Arm of Lake Hartwell is considered to be a relatively low energy environment and net depositional. PCB distribution in surface sediments could be described as low-level and wide-spread, without distinct hot-spots. Average PCB concentrations it surficial sediments (*e.g.*, 0 to 6 inches) of the focused study area were generally in the 1 to 10 mg/kg range.

Vertical sediment cores indicated PCB concentrations increased with depth, and the maximum detections generally occurred 30 cm to 50 cm below the surface water/sediment interface. Historically, the maximum PCB detection was 153 mg/kg, although the maximum detected during the RI was 61 mg/kg. RI results indicated that PCB concentrations in sediments had declined significantly from the mid-1900s due to burial and dispersion processes. These conclusions were supported by sediment transport modeling that predicted net sediment accumulations ranging from 5 to 15 cm/yr in the portions of Twelve Mile Creek Arm of Lake Hartwell that historically had the highest levels of PCBs.

The biological investigations conducted during the RI/FS phase confirmed that PCBs were detected in all levels of the food chain, including drift net samples, *corbicula* (*e.g.*, fresh water clams) baskets, smaller forage fish, and migratory/non-migratory game fish. The biological investigation also supported conclusions of the sediment component that 1) the Sangamo Plant Site is the primary source of PCB contamination in Twelve Mile Creek, and 2) the contribution of PCB input to the Twelve Mile Creek watershed from the satellite disposal areas is negligible. Fish in Lake Hartwell were found to contain PCBs at levels often higher than the FDA safe tolerance limit of 2 mg/kg. PCB concentrations in non-migratory fish (*e.g.*, channel catfish/largemouth bass) were highest in the Twelve Mile Creek Arm of Lake Hartwell, and levels decreased at sample stations within Lake Hartwell proper. Migratory fish (*e.g.*, hybrid bass) had PCB levels that are similar throughout the entire reservoir, and were generally above the 2 mg/kg level. Aquatic bioaccumulation modeling was also conducted to predict future

PCB levels in fish of the Twelve Mile Creek/Lake Hartwell system using the Food and Gill Exchange of Toxic Substances (FGETS) model. In response to decreasing water column and surface sediment PCB concentrations, largemouth bass concentrations in the Twelve Mile Creek Arm of Lake Hartwell were predicted to fall below the 2 mg/kg FDA level in the 2003 to 2005 time frame.

The need for future response actions at Sangamo OU-2 were largely driven by human health risks associated with the consumption of PCB-contaminated fish. The highest cancer risk of 4×10^{-2} was calculated for anglers exclusively consuming largemouth bass in the Twelve Mile Creek watershed. The highest cancer risk for ingestion of all species combined, 1×10^{-2}, was calculated for the Twelve Mile Creek Arm of Lake Hartwell. The lake-wide risk associated with ingestion of all fish species combined was 5×10^{-2}. From an ecological risk perspective, the biological investigations documented the presence of PCB contamination in all levels of the aquatic food web. Habitat degradation from development may also result in adverse impacts at the population and community levels. The health of fish in Lake Hartwell did not appear to be affected at the population level for fish that have PCB concentrations around 5 mg/kg (*e.g.*, average concentrations in fish at ROD time). However, there was historical evidence that as concentrations increased to greater than 20 mg/kg, fish health could be affected.

Pursuant to the findings and conclusions of the RI/FS, USEPA issued a Proposed Plan in April 1994 for the Sangamo OU-2 site. The preferred alternative incorporated a fishery isolation barrier, and a series of institutional controls that included a public education program, fish/sediment monitoring, and regulation of the Twelve Mile Creek impoundments. A fishery isolation barrier was proposed at the Highway 37 Bridge to prohibit movement of migratory fish (*e.g.*, hybrid bass) into the impacted areas of Lake Hartwell. Fishery isolation of these upstream areas, which represent less than 10 percent of the total area of Lake Hartwell, was expected to result in an accelerated decline in hybrid bass PCB concentrations for the remaining + 90 percent of the reservoir. Migratory fish represent approximately 50 percent of the fish harvested by weight from Lake Hartwell. Reduction of fish PCB levels would allow for rescinding existing fish advisories in these areas, returning the majority of lake to the maximum beneficial uses for the reservoir.

However, moderate public opposition was expressed towards USEPA's preferred alternative during the formal public meeting and in subsequent written comments received during the comment period. The public cited two general reasons, behind their opposition: 1) very little confidence with USEPA's ability to design, construct, and maintain a safe fishery isolation barrier that would meet the established Performance Standards at the estimated cost; and 2) Institutional Controls provide the most reliable mechanism for reducing human exposures to PCB-contaminated fish, so the incremental cost of the fish barrier is not warranted.

Community involvement has continued during the second FYR timeframe, and continues to be focused on the OU-2 portion of the site, particularly focusing on the activities associated with the Woodside 1 and 2 dam removals.

3.4 Initial Response

In 1987, an Administrative Order on Consent with STC was signed for Performance of RI/FS. In 1992, a Consent Decree with STC was lodged in court. In 1993, the State entered into a Consent Order with the owners of two small hydroelectric impoundments to develop a more effective sediment management plan. In 2004, negotiations between NRT and STC took place over a NRDA and settlement.

3.5 Basis for Taking Action

The contaminated media of concern for the OU-2 portion of the site is sediment. The primary contaminant of concern is PCBs. Potential threats at the site include human health risks associated with the consumption of PCB-contaminated fish.

Section 4
Remedial Actions

4.1 Remedy Selection

Based upon the findings of the RI and associated Baseline Risk Assessment (human health/ecological), USEPA developed RA objectives to support the identification, development, and screening of remedial alternatives. These RA objectives were:

- Mitigate continued migration of PCB-contaminated sediments into Lake Hartwell by eliminating releases of PCBs into Twelve Mile Creek.
- Control or eliminate the downstream migration of PCB-contaminated sediment within the Twelve Mile Creek Arm of Hartwell Lake.
- Limit, to the extent feasible, the transfer of PCB contaminants from sediment to biota.
- Prevent or minimize exposure to fish with PCB contamination above target risk (or FDA) levels.

Protection of human health is considered the primary driver for developing and evaluating remedial action alternatives.

The major components of the remedy selected in the 1994 ROD for OU-2 include the following:

- Continuation of the existing fish consumption advisory on Lake Hartwell.
- Implementation of a public education program to increase the awareness of the advisory and methods to prepare/cook fish to reduce the quantity of contaminants consumed,
- Continued monitoring of aquatic biota and sediment to support continuance and/or justify modifications to the existing advisory.
- Regular flushing of sediments trapped behind three impoundments on Twelve Mile Creek to: facilitate burial of contaminated sediments further downstream while mitigating adverse impacts to Lake Hartwell water quality

4.2 Remedy Implementation

This section of the FYR Report provides a summary of the activities conducted since the Consent Decree was signed. The summary is presented by each of the major remedy components.

4.2.1 Continuation of the Fish Consumption Advisory

A fish consumption advisory, warning the public against eating fish from the Seneca River Arm of Lake Hartwell north of State Highway 24 and Twelve Mile Creek, was originally issued by SC DHEC in 1976. This advisory has been modified several times and remains in effect. Signs warning against eating fish have been posted at the majority of the public boat launch and recreation areas in South Carolina since 1987. The current advisory adopts a risk-based approach that issues meal frequency advice to Lake Hartwell anglers based on species harvested and PCB concentration trends in fish tissue. The Lake Hartwell PCB fish advisory for South Carolina and Georgia is posted at http://www.scdhec.gov/environment/water/fish/Advisories/hartwell.htm. The advisory is summarized in the following table.

ARM OF LAKE HARTWELL	KINDS OF FISH	CONSUMPTION ADVICE [1]
South Carolina – Seneca River Arm	ALL FISH	DO NOT EAT ANY
South Carolina – Twelve Mile Creek	ALL FISH	DO NOT EAT ANY
South Carolina – Remaining Waters of Lake Hartwell	Hybrid and Striped Bass	DO NOT EAT ANY
Georgia- Tugaloo Arm	Hybrid Bass/Striped Bass	DO NOT EAT ANY over 16 inches
	Channel Catfish over 16 inches Hybrid/Striped Bass 12 to 16 inches Largemouth Bass over 16 inches	One meal per month
	Largemouth Bass less than 16 inches Black Crappie Hybrid/Striped Bass less than 12 inches Channel Catfish less than 16 inches	One meal per week

[1] A meal is a half-pound (8 ounces) serving of fish.

4.2.2 Aquatic Biota and Sediment Monitoring

Annual monitoring of sediments and aquatic biota has been conducted by STC, pursuant to USEPA approved work plans, in the spring of each year since the ROD was issued in June 1994. This effort includes: 1) sediment sampling at 21 locations in Twelve Mile Creek, the Twelve Mile Creek Arm of Lake Hartwell, and portions of Lake

Hartwell proper; 2) fish tissue analyses at six stations in Lake Hartwell for largemouth bass, catfish, and hybrid bass, 3) fish tissue analyses on forage fish species at three locations in Lake Hartwell, and 4) 28-day caged *corbicula* analyses at seven stations in Twelve Mile Creek.

Additionally, USEPA's NRMRL and NERL conducted three phases of research on Lake Hartwell to gain a better understanding of natural mechanisms that contribute to the recovery of PCB-contaminated sediments. Moreover, the goal of these investigations was to develop and evaluate physical, chemical, and biological tools and approaches for measuring the short- and long-term performance of MNR remedies. The scope of the three phases of investigation is briefly summarized below.

Phase 1 (USEPA/Battelle report dated September 25, 2001)

- Collection of 10 sediment cores at transects that coincide with annual monitoring stations and sediment modeling efforts;
- Age dated sediment cores using Lead-210 and Cesium-137 techniques to determine sediment accumulation rates (cm/yr) and sedimentation rates (g/cm^2-yr)
- Detailed PCB congener analyses to identify vertical/lateral congener profiles and trends;
- An evaluation of PCB compositional changes (*e.g.*, level of chlorination) in historically deposited sediments; and
- A comparison of age dating results with sediment deposition rates predicted by the modeling effort.

Phase 2 (USEPA/Battelle report dated June 30, 2002)

- Collection of 8 sediment cores at 3 transects previously studied in Phase 1;
- Collection of 21 surface sediment and nine high volume surface water samples within the Twelve Mile Creek watershed and near the former Sangamo Plant Site;
- Sediment age dating using Lead-210 and Cesium-137 techniques; and
- PCB congener analysis to identify historical PCB depositional patterns, PCB weathering patterns (*e.g.*, dechlorination), and PCB end member analysis (*e.g.*, fingerprint patterns).

Phase 3 (Draft USEPA/Battelle report dated April 2003)

- Development of a fully integrated ecological model to assess the ongoing impact of PCB contaminated sediments on the benthic and aquatic environments,
- Tests were conducted at three stations, two within the Twelve Mile Creek Arm of Lake Hartwell, and one background station,
- PCB surface sediment and surface water sampling/analysis,
- Biota collection analysis which included native fish collection, Hester Dendy trap deployment for macroinvertebrate sampling, Fat Head Minnow (FHM) cage deployment, corbicula cage deployment, and phytoplankton collection;
- Deployment of semi-permeable membrane devices (SPMDs) to simulate uptake by fish lipids,
- Volatilization studies to measure diffusion from the lake surface,
- Deployment of PCB gas flux chambers to measure gas evolution from the sediment surface, and
- Evaluation of effective transport of the water through the sediments using a network of piezometer wells

The results of 9 years of annual monitoring and 3 phases of USEPA-NRMRL/NERL investigations are too voluminous to present in detail in this FYR Report. The reader is referred to the reports listed above and in Section 6of this FYR Report for a more detailed account of the findings and conclusions. The following text provides a brief overview of the results.

In general, PCB sediment concentrations have decreased steadily as the deeper, more impacted sediments are covered by physical sedimentation processes typical of man-made, freshwater reservoir ecosystems. Surficial sediment data in April 2008 in the Twelve Mile Creek Arms of Lake Hartwell indicate an approximate 10 to 50 fold reduction in PCB concentrations when compared to historical data. PCB concentrations in surficial sediments of the Twelve Mile Creek Arm of Lake Hartwell were reported in the 1 to 5 mg/kg range during the most recent sampling events, which occurred in April 2008. Surfical sediments: in the upper Twelve Mile Creek Arm of Lake Hartwell (*e.g.*, portions impacted by previous hydraulic dredging and flushing events) have PCB concentrations generally below the 1 mg/kg cleanup goal selected in the ROD. Sediment age dating results and statistical analysis using the 95% confidence interval were used to predict the sedimentation and time required to achieve the 1 mg/kg clean-up goal. This

analysis, which was performed in 2003 predicts that the majority of the surficial sediments in the Twelve Mile Creek Arm of Lake Hartwell will achieve the 1 mg/kg clean-up goal between 2007 and 2011.

However, annual monitoring results for largemouth bass, channel catfish, and hybrid bass indicate PCB tissue concentrations have not responded measurably to the decreased surface sediment trends. Despite the consistent data set, PCB trend analysis in fish tissue have proven to be a difficult task given the many variables involved (*e.g.*, gender, lipid content, age/size of fish caught, number of fish caught per station, dietary considerations, migratory behavior, etc.). PCB concentrations in largemouth bass in the Twelve Mile Creek and Seneca River Arms of Lake Hartwell continue to be above the 2 mg/kg FDA limit, although channel catfish from these stations dropped, below 2 mg/kg limit in 1999 and have remained below that level. PCB concentrations in hybrid bass remain greater than 2 mg/kg at all six stations in Lake Hartwell.

Consistent with the results of the RI/FS, the Phase 3 USEPA-NRMRL/NERL report documented the presence of PCBs in all media evaluated for the two stations within the Twelve Mile Creek Arms of Lake Hartwell. At the risk of oversimplification, it appears that diffusion/advection from surficial sediments to the pore water and surface water is playing an important role in PCB transfer to upper trophic level receptors. For example, *corbicola* baskets deployed for 28 days near the former Sangamo plant discharge point in Town Creek and within the Twelve Mile Creek watershed are accumulating PCBs in the 1 to 2 mg/kg range. Co-located sediment samples and high volume surface water samples are generally reporting detectable concentrations of PCBs in the parts per billion and parts per trillion range, respectively.

Pursuant, to these findings, USEPA-NRMRL/NERL suggested that PCB contribution from the former Sangamo Plant Site may be the continuing source of PCB loading to Town Creek. Review of groundwater recovery system capture zones, the resultant potentiometric surface of the groundwater table, and monitoring well data from the former Sangamo plant wastewater treatment lagoons indicate a potential for a groundwater to surface water transport pathway. As a result, the 2004 annual monitoring program was modified to include placement of *corbicula* baskets at regular intervals along the suspect reach of Town Creek. The goal of this continuing source investigation is to identify sub-reaches of Town Creek that may be contributing PCBs to the system. Investigative work continues to be evaluated in efforts to identify the continuing source to Town Creek.

It is also possible that Twelve Mile Creek continues to export low levels of PCBs into Lake Hartwell that may delay recovery in the Twelve Mile Creek Arm of Lake Hartwell. Potential vehicles for PCB, export from Twelve Mile Creek include contaminated sediments, organic carbon, and organisms such as, fish. USEPA-NRMRL/NERL conducted a 2 year survey (*e.g.*, 2003-2004) of PCB levels in resident biota in Town Creek and Twelve Mile Creek. This study was designed to determine the extent and distribution of residual contamination within the Twelve Mile Creek ecosystem and to determine potential pathways of PCB bio-magnification through the stream's food web

As a result of this study, USEPA-NRMRL/NERL recommended some modifications to the annual aquatic biota and sediment monitoring program that is conducted by STC. These modifications reflect the advances in the technical community's understanding of PCB science since the annual monitoring program was first formulated in 1994. The modifications generally include adding congener specific analysis for fish, *corbicula*, and sediment at select stations, adding more replicates for forage fish species to increase the strength of statistical evaluations, adding lipid analysis for *corbicula* samples, and reducing gender bias in game fish samples.

4.2.3 Twelve Mile Creek Impoundments

Of the four remedy components specified in the June 1994 ROD, ensuring regular, downstream passage of sediments trapped behind the 3 impoundments on Twelve Mile Creek has proven to be the most challenging for USEPA. The primary goal of USEPA's Sangamo OU-2 remedy is to use the natural sedimentation processes of Twelve Mile Creek to deliver sediment to the Twelve Mile Creek Arm of Lake Hartwell, thus providing a clean sediment cap on top of PCB-impacted sediments to prevent further re-suspension and transport of sediments throughout the creek and lake ecosystem.

A significant quantity of the sediment bed load transported via the upper reach of Twelve Mile Creek is trapped behind three impoundments. The first, or uppermost dam, is owned by the E-C Water District which uses the head pool for raw water storage. The E-C dam is equipped with high flow sluice gates, which provides E-C control with regard to when they flush sediments, and how much material they flush per event. E-C sluices sediments approximately quarterly, and their flushing schedule generally meets the requirements specified in the ROD.

The second and third dams on Twelve Mile Creek are Woodside 1and Woodside 2, respectively. Woodside 1 and Woodside 2 are small hydroelectric impoundments that are currently owned and operated by Consolidated Hydro Southeast. Woodside 1 and Woodside 2 are reported to produce a combined electrical output of 2.5 million

kilowatt/year, and both dams are equipped with low flow sluice gates. Historically, sediment was flushed downstream via sluice gates when sediment accumulations began to interfere with power generation. Sediment flushing events during low flow periods in 1984 and 1995 were documented to have adverse impacts on water quality, stream habitat, and in some instances resulted in fish kills.

In response to the September 1995 flushing event, SC DHEC entered into a Consent Order with the owners of Woodside 1 and Woodside 2 (*e.g.*, Consolidated Hydro) in June 1994 to develop a more effective sediment management plan. Further discussions between SC DHEC, USEPA, Consolidated Hydro and STC produced the following agreements which were mutually acceptable to all stakeholders: 1) Consolidated Hydro would no longer flush sediment downstream through the Woodside 1 and Woodside 2 sluice gates; and 2) Consolidated Hydro would install automated trash rack rakes immediately in front of the respective intake structures to suspend accumulations of sand/sediment that would subsequently be passed downstream through the turbines. In September 1997, Consolidated Hydro informed all involved entities that while the rake's were performing as expected, the quantity of sediment accumulation was greater than can be passed through the turbines without causing severe damage to the turbine shafts and bearings due to excessive abrasive action.

In March 1998, STC completed an analysis of feasible sediment management alternatives to fulfill the requirements of the ROD. This FS evaluated a number of alternatives that included installation of new high flow sluice gates, complete purchase and removal of the impoundments by STC, and a dredging alternative that would pump sediments over the respective impoundments. When considering the evaluation criteria of technical feasibility, cost effectiveness, non-interference with the power operations, and overall protection of human health and the environment, the dredging and pumping alternative rated the most favorably.

In October 1998, dredging was first initiated at the Woodside 1 and Woodside 2 impoundments via a Nationwide Permit No 38 from the USACE. A portable cutterhead dredge, suction pump, and flexible 8-inch discharge line was used to pass material from the respective head pools to the downstream tailrace. In theory, all dredged material pumped over the dams would be ultimately transported to the Upper Twelve Mile Creek Arm of Lake Hartwell by utilizing the natural bed load carrying capacity of Twelve Mile Creek. Based on the specifications of the dredge equipment, and an assumption that the head pools would be ultimately maintained at a 15 to 20 foot depth for 300 yards upstream, it was estimated that the cutterhead dredge would operate 10 hrs/day for 35 days/year at each location. An estimated 7,000 cubic yards (cy) was

pumped downstream of Woodside 1 and Woodside 2 during the October 1998 dredging event. During this time, residents that lived in close proximity to the dredging operations first began to express concerns about localized accumulations of sediment near Lay Bridge (*e.g.*, downstream of Woodside 2) and associated impacts to benthic communities and aquatic plants.

A second dredging event was conducted in July 1999 when an estimated 10,000 cy of sediment was dredged and passed downstream of the Woodside 1 and Woodside 2 impoundments. The summer months in upstate South Carolina are typically low flow periods and residents along the Twelve Mile Creek corridor and in the nearby village of Cateechee again expressed their concerns regarding negative impacts to the creek caused by localized accumulations of sediment. In response to these concerns, biologists from both USEPA and SC DHEC conducted pre- and post-dredging aquatic macroinvertebrate assessments on Twelve Mile Creek in an attempt to quantify damages caused by the hydraulic dredging events. Both technical reports (*e.g.*, see references under Section 6) generally concluded that hydraulic dredging events had caused short-term impacts to stream habitat and benthic communities, but stream conditions improved to background conditions once a sufficient storm event occurred to move localized sediment accumulations further downstream into the headwaters of Lake Hartwell.

In September 1999, a meeting was held at SC DHEC's offices in Columbia, South Carolina with involved stakeholders to develop a mutually acceptable path forward regarding a sediment management plan for the Woodside 1 and Woodside 2 impoundments. At this meeting, USEPA agreed to limit hydraulic dredging to the typically high flow months of December through February. This time frame also avoids creating a turbidity issue in Twelve Mile Creek during fish spawning periods in the spring and early summer. USEPA also committed to conducting sediment transport modeling and to evaluating additional sediment management alternatives. Field data to support sediment transport modeling was conducted in December 1999. Sediment transport modeling was conducted to predict the fate of sediments flushed and dredged from the Woodside 1 and Woodside 2 dams from April 1995 to September 1999. Additional sediment management alternatives evaluated included extending the hydraulic dredge pipeline 5 miles to the headwaters of Lake Hartwell (*e.g.*, Maw Bridge), and Hydrosuction Sediment Removal Systems (HSRS). An HSRS is a pipeline system capable of transporting a water/sediment slurry past a dam using the natural energy represented by the difference in water surface elevations between the upstream and downstream sides of a dam. Results of the sediment transport modeling and the second iteration of sediment management alternatives are presented in April 25, 2000

technical report prepared by the USACE, Engineer Research and Development Center, Waterways Experiment Station.

Pursuant to the conclusions of the April 25, 2000, report, USEPA proposed installing high flow sluice gates on the back side of the Woodside 1 and Woodside 2 impoundments, similar to those of the E-C Water District impoundment. A high flow sluice gate evaluation conducted by RMT, on behalf of STC, estimated the cost of installation at $610,000 total (*e.g.*, approximately $300,000/dam). In June 2000, USEPA notified the NRTs and other involved stakeholders of plans to direct STC to install high flow sluice gates on Woodside 1 and Woodside 2 pursuant to the ROD and effective Unilateral Administrative Order (UAO). By this time the NRTs had initiated a NRDA process that included a component for Twelve Mile Creek dam removal and subsequent stream corridor restoration. The NRTs asked USEPA to postpone capital improvements to Woodside 1 and Woodside 2 and USEPA agreed to monitor progress of the NRDA settlement negotiations.

Hydraulic dredging of sediment from the head pools of Woodside 1 and Woodside 2 was conducted again in January 2001 and February 2002. Hydro-power generation at Woodside 1 ceased in July 2003 and at Woodside 2 in September 2003 due to excessive accumulation of sediment in the head pools. Data collection and sediment modeling performed in November 2002 to support dam removal evaluations indicate there was approximately 300,000 cy of sediment currently entrained behind the three Twelve Mile Creek impoundments. A technical agreement in principle has been reached between the NRTs and STC regarding a NRDA settlement that would, among other items, involve removal of the Woodside 1 and Woodside 2 dams. In August 2004, the NRTs and STC met with property owners along the approximate 10,000 foot reach of Twelve Mile Creek that was proposed for restoration to discuss access arrangements. The NRTs and STC are expected to release the formal Lake Hartwell Restoration and Compensation Determination Plan during 2009.

USEPA fully supports the dam removal concepts envisioned in the NRDA settlement as it represents the most permanent solution to ensuring natural sediment transport downstream to the Twelve Mile Creek Arm of Lake Hartwell. USEPA continues to monitor the progress of the NRDA settlement and in September 2009 issued an ESD to the 1994 ROD which allows for dam removal and stream corridor restoration to move forward.

4.2.4 Public Education Program

The Public Education Program was initiated in 1998 to make users of Lake Hartwell aware of current fish consumption advisories and to assist them in making informed decisions regarding consumption of fish harvested from the lake. Approximately 20,000 copies of this brochure were printed and distributed in July 1998 to an estimated 8,000 dock permit holders on Lake Hartwell, an estimated 1,400 members of the Lake Hartwell Association, approximately 100 retail outlets in six counties that border the lake which sell fishing licenses, the USACE Lake Hartwell Visitor Center, South Carolina and Georgia Welcome Centers on Interstate 1-85, Lake Hartwell campgrounds and day use areas, local Chamber of Commerces, and miscellaneous personnel with involved State regulatory agencies.

The success of this effort was measured by postage paid survey .cards attached to the brochure. The Agency received replies to approximately 3 to 4 percent of the total volume distributed. The results of this effort are summarized in the table below and indicate a high success rate in effectively communicating the intended message. For example, 364 of respondents indicated that "most" of the information presented in the brochure was new, and an additional 58 percent indicated that "some" of the information was new. The replies to the remaining questions were also very encouraging, with favorable response rates in the 90th percentile range.

The 1998 public education brochure was followed up with a telephone survey to provide a sense of the level of public awareness of' fish advisories for Lake Hartwell, and how these advisories are affecting fish consumption of nearby residents. The telephone survey targeted nearby residents who might fish in Lake Hartwell, rather than known users of the lake. Specifically, 100 residents from each of six counties (Anderson, Pickens, and Oconee in South Carolina, Hart, Franklin, and Stephens in Georgia) for a total of 600 respondents were interviewed front March 10-12, 2000. The general conclusions of this effort are summarized below:

- Most respondents are aware of the fish advisories through a variety of sources.
- Respondents who indicated that they possessed a fishing license (39 percent) were more likely to: be familiar with fish advisories, to have obtained .a copy of the brochure that was distributed, and to report being influenced by its contents.
- Relatively few responders, (11 percent) consume the Lake Hartwell fish; of those 11 percent, half eat lake fish less than once a month.
- Of those respondents who consume Lake Hartwell fish, 46 percent follow the fish advisories.

- The majority of respondents who received a brochure read all or most of it.
- An overwhelming majority of respondents who read the brochure said it helped them make an informed decision about catching and consuming fish from the lake.

In 1999, SC DHEC conducted a health consultation, under a cooperative agreement with the ATSDR, to determine whether people consuming fish from Lake Hartwell are being exposed to elevated levels of PCBs. The target population were people who lived nearest Twelve Mile Creek and the Seneca River Arm of Lake Hartwell. The health consultation was conducted in two phases.

Phase I included the distribution of a 1 page survey to screen for people who had eaten fish from the focused study area in the previous year. Approximately 11,000 surveys were distributed throughout Anderson, Pickens, and Oconee counties in South Carolina. Approximately 10.000 surveys were distributed to 22 public schools (11-12) and another 1,000 were distributed to local SC DHEC and SC Department of Natural Resource Offices, Clemson University, bank fisherman, the Town Hall of Pendelton and upon request. There were 3,864 surveys returned for a response rate of 35 percent. For the survey respondents, 57 percent were aware of the Lake Hartwell fish consumption advisory, and 92 percent did not eat any fish in the past year. Only 310 (8 percent) stated they ate fish in the past year.

Phase II consisted of an exposure investigation in which 30 individuals who reported eating fish from Lake Hartwell in the past year participated in blood sampling. Serum PCB levels in the 30 participants ranged from less than the detection limit (3 μg/L) to 19.5 μg/L. Eighteen participants had non-detectable levels in their blood. Ten participants had levels between 3 and 10 μg/L. The mean level was 33 μg/L, using 1.5 μg/L as the default value for non-detects. The one individual who had the highest value, reported (195 μg/L) had reportedly been occupationally exposed while working at the Sangamo plant impregnating capacitors with PCBs from 1965-1966.

SC DHEC aid ATSDR concluded that serum PCB levels in the exposure investigation participants were very similar to those in previous studies of the general U.S. population, and less than expected for this group of fish consumers. The general U.S. population mean serum PCE level ranges from 0.9 to 115 μg/L. Under ATSDRs public health hazard categories, the exposure pathway evaluated for this effort would be classified as no apparent public health hazard. The exposure from fish consumption appears to be minimal and health efforts are unlikely for people that eat small to moderate amounts of fish. However, there are inherent uncertainties associated with

investigations of this nature (*e.g.*, small number of participants in blood sampling/best sample population not recruited for this health consultation)

Fish consumption advisory signs are posted at approximately 80 locations along the shores of Lake Hartwell at boat ramps and known fishing spots accessed by the public. Information regarding PCB related fish consumption and cleaning can be found at the following link: http://www.scdhec.gov/environment/water/fish/Advisories/hartwell.htm.

4.3 System Operations/Operations and Maintenance

The primary activities associated with operations and maintenance (O&M) include the following:

- Maintenance of the Fish Advisory and periodic inspection of Advisory Signs
- Annual Monitoring of sediments and aquatic biota
- Periodic dredging behind Woodside 1 and 2 dams to ensure downstream passage of sediments.

Monitoring costs for OU-2 are included in Table 2. Monitoring costs associated with OU-1 are included in the OU-1 FYR Report. In addition to the annual O&M costs, the 2009 annual costs included an additional $70,000 for installation of the fish advisory signs.

Table 2
Annual System Operations/O&M Costs

DATES		TOTAL COST ROUNDED TO NEAREST $1,000
FROM	TO	
2005	2006	$125,000
2006	2007	$141,000
2007	2008	$126,000
2008	2009	$138,000

Section 5
Progress Since the Last Five-Year Review

The Protectiveness Statement from the 2004 FYR for OU-2 stated the following:

> *The MNR/Institutional Controls remedy for OU-2 is considered adequately protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future. Soil cleanup at OU-1 is completed, and active groundwater recovery and treatment continues at the Breazeale Site and the Plant Site. Since operation and maintenance of these systems will be optimized to meet established performance standards, this site is considered adequately protective of human health and the environment.*

The 2004 FYR Report included four recommendations. The 2004 FYR Report did not state who would perform the actions, with the exception of the first recommendation, nor did it include milestone dates. Each recommendation and the current status is discussed in Table 3.

Table 3
Progress on Recommendations from the 2004 FYR

SECTION	RECOMMENDATIONS	PARTY RESPONSIBLE	MILESTONE DATE	ACTION TAKEN AND OUTCOME	DATE OF ACTION
5.1	SC DHEC to continue to administer the existing fish consumption advisory, and implement modifications as warranted by the annual aquatic biota and sediment monitoring program. New or updated fish advisory signs should be installed as necessary	SC DHEC	N/A	The fish consumption advisory remains in effect on Lake Hartwell. Approximately 80 fish advisory signs were posted at all USACE lake access points in both Georgia and South Carolina for OU-2 in April 2009.	April 2009
5.2	Continue the annual aquatic biota and sediment monitoring program specified by the 1994 ROD. Modifications to annual monitoring program as recommended by USEPA-NRMRL/NERL were implemented during the 2004 sampling event. The utility of this additional data will be evaluated upon receipt of the 2004 data, and decisions will be made at that time regarding the scope of future monitoring events.	N/A	N/A	Annual monitoring of sediments and aquatic biota has been conducted by STC, pursuant to USEPA approved workplans, in the spring of each year since the ROD was issued in June 1994	Monitoring annually since 1994 ROD. Modifications to sampling program in 2004
5.3	Support the ongoing NRDA settlement process regarding dam demolition and Twelve Mile Creek stream corridor restoration as described in the CD.	N/A	N/A	USEPA issued an ESD for the site	09/03/09
5.4	As stated in Part 1 of this FYR, investigations into the potential groundwater to surface water pathway at the Sangamo Plant Site and Town Creek are be evaluated, and follow-up investigations will be implemented as appropriate.	N/A	N/A	Follow up evaluations	Ongoing

This section of the FYR Report provides a summary of the RAs performed since the last FYR Report.

The remedy at OU 2 currently protects human health and the environment because is considered adequately protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future. Remedial technologies for accelerating cleanup at the Plant Site portion of OU-1 areas will be implemented in the near future for the Plant Site. Since operation and maintenance of these systems will be optimized to meet established performance standards, this site is considered adequately protective of human health and the environment. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Dam removal and stream restoration at OU-2.
- Evaluation of remedial technologies for accelerating cleanup at Plant Site portion of OU-1 to evaluate the potential for a groundwater to surface water exposure pathway.

The following discussion is organized and presented by the four major components of the selected MNR/Institutional Control's remedy for Sangamo OU-2.

5.1.1 Continuation of the Fish Consumption Advisory

The fish consumption advisory remains in effect on Lake Hartwell. Approximately 80 fish advisory signs were posted at all USACE lake access points in both Georgia and South Carolina for OU-2 in April 2009. A photograph of the advisory signs is included in the photolog in Appendix C.

5.1.2 Aquatic Biota and Sediment Monitoring

Annual monitoring of sediments and aquatic biota has been conducted by STC, pursuant to USEPA-approved workplans, in the spring of each year since the ROD was issued in June 1994. This effort includes: 1) sediment sampling in Twelve Mile Creek, the Twelve Mile Creek Arm of Lake Hartwell, and portions of Lake Hartwell proper; 2) fish tissue analyses in Lake Hartwell for largemouth bass, catfish, and hybrid bass, 3) fish tissue analyses on forage fish species in Lake Hartwell, and 4) 28-day caged *corbicula* analyses in Town and Twelve Mile Creek.

Pursuant, to findings described above for the USEPA-NRMRL/NERL three phase evaluations, USEPA recommended modifications to the annual aquatic biota and sediment monitoring program that is conducted by STC. These modifications reflect the advances in the technical community's understanding of PCB science since the annual monitoring program was first formulated in 1994.

The 2008 monitoring period included the additional sampling and analysis recommended by USEPA. Additional sampling included:

- The analysis of fish for lipid concentration in addition to Aroclor PCBs,
- The addition of three more samples of each forage fish species at each of the three forage fish sampling locations for a total of four composite forage fish samples species compared with one, and
- The sampling and analysis of *corbicula* from six additional locations for a total of 12 locations.

All of the additional sampling in 2008 was agreed to in response to the evaluation of the large-scale, one-time sampling modifications of 2004.

5.1.3 Twelve Mile Creek Impoundments

Data collection and sediment modeling performed in November 2002 to support dam removal evaluations indicate there is approximately 300,000 cy of sediment currently entrained behind the three Twelve Mile Creek impoundments. A technical agreement in principle has been reached between the NRTs and STC regarding a NRDA settlement that would, among other items, involve removal of the Woodside 1 and Woodside 2 dams. In August 2004, the NRTs and STC met with property owners along the approximate 10,000 foot reach of Twelve Mile Creek that is proposed for restoration to discuss access arrangements. A Consent Decree was signed in May 2006 for the dam removal activities.

Expedited removal of the dams was ordered by a court judge in summer 2009. It is anticipated that the dam removal will be concluded during the next FYR period.

USEPA fully supports the dam removal concepts envisioned in the NRDA settlement as it represents the most permanent solution to ensuring natural sediment transport downstream to the Twelve Mile Creek Arm of Lake Hartwell. USEPA continues to monitor the progress of the NRDA settlement and issued an ESD in September 2009.

5.1.4 Public Education Program

The Public Education Program was implemented to ensure awareness of current fish consumption advisories Lake Hartwell. In April 2009, fish consumption advisories signs were replaced and posted at more than 80 locations along the shores of Lake Hartwell at boat ramps and known fishing spots accessed by the public. Additional information regarding fish consumption advisories can be found at the following link: http://www.scdhec.gov/environment/water/fish/Advisories/hartwell.htm.

Section 6
Five-Year Review Process

6.1 Administrative Components

The FYR was initiated on March 3, 2009, with the FYR scoping meeting. The FYR team was led by Craig Zeller of USEPA, Region 4, RPM for the Sangamo Superfund Site. The team also consisted of staff from the support agency, SC DHEC (Greg Cassidy and Charles Williams), STC (PRP) and RMT (O&M Manager/Consultant).

From March 3, 2009 to September 5, 2009, the review team established a review schedule whose components included the following:

- Community Involvement
- Document and Data Review
- FYR Team Meeting
- Site Inspection
- FYR Report Development and Review

6.2 Community Notification and Involvement

On June 12, 2009, a public notice was published in the Greenville News and Pickens Count Sentinel announcing the commencement of the FYR process for the Sangamo site, providing Craig Zeller's contact information, and inviting community participation. The press notice is available in Appendix B. No inquires were made to USEPA as a result of this advertisement.

The FYR report will be made available to the public once it has been finalized. Copies of this document will be placed in the following designated public repositories:

RM Cooper Library
Clemson University
South Palmetto Boulevard
Clemson, SC 29631

Pickens County Public Library - Easley Branch
110 West First Avenue
Easley, SC 29640

Hart County Library
150 Benson Street
Hartwell, GA 30643

6.3 Document Review

The FYR effort for Sangamo OU-2 primarily consisted of review of technical documents that were generated to facilitate the remedy effectiveness evaluation. The documents listed below were reviewed to support preparation of this FYR and are attached to this report as references.

- Final ROD for OU-2 of the Sangamo Weston/Twelve Mile Ceek/Lake Hartwell PCB Contamination Superfund Site, Pickens County, SC (USEPA – Region 4, June 28, 1994)
- URS 2004-2008. Lake Hartwell Fish and Sediment Study. OU-2 Monitoring Program.

6.4 Clean-up Goals

Clean-up goals for OU-2 were established by USEPA in the ROD for PCBs in sediment and fish tissue (see Table 4).

Table 4
Summary of Clean-up Goals for OU-2

MEDIA OF CONCERN	1994 ROD CLEAN-UP GOALS (mg/kg)	CURRENT CLEAN-UP GOALS (mg/kg)	CHANGES?
Sediment	1	1	No
Fish Tissue	2	2	No

6.5 Data Review

The annual reports present the detailed results of the sediment and biological monitoring for OU-2. The 2008 report includes an evaluation of trends. A brief summary of the trends for each media are described below.

- Measurable declines in surface sediment PCB concentrations in Twelve Mile Creek Arm of Lake Hartwell. Sediment values ranged from non-detect concentrations observed in the Wolf Creek and Town Creek tributaries of Twelve Mile Creek to 0.60 mg/kg collected at SD-004 in the Twelve Mile Creek. The maximum observed concentration of 3.15 mg/kg was detected in the lake. Overall, concentrations in have declined from observed concentrations of 23.3 mg/kg in 1995.
- Measurable declines in *corbicula* PCB concentrations at Sangamo discharge point. Observed PCB concentrations in 2008 PCBs were detected in 11 of the 12 monitoring site samples ranging from <0.02 in Wolf Creek to 2.0 ppm in Town Creek. Concentrations observed in

1995 were as high as 10 mg/kg. Historically, the highest *corbicula* tissue concentrations have been reported from Station C-1 in Town Creek. The average PCB concentration in *corbicula* tissues was similar to 2007. The 2007 and 2008 survey periods were slightly higher than the 2005 and 2006 survey years, but are lower than historic values. The average PCB concentration for all 12 stations was 0.654 mg/kg which is much lower than 2004 and previous years. Percent lipid has been measured as a component of the *corbicula* analysis since 2004. The lipid concentration in *corbicula* averaged 2.3 percent in 2004. The lipid concentration averaged 1.5 percent for all samples in 2005 as well as 2006. During 2007, the average lipid concentration dropped to 0.67 percent, which is a substantial reduction from previous years. This may be due to the drought year and lack of good flow and nutrients throughout the system. During 2008, the average lipid concentration was 1.43 percent, and very similar to 2005 and 2006. The lipid normalized PCB concentrations indicate that 2008 values are similar to the 2004 survey

- No consistent trends of PCBs have been observed in fish tissue.
  - The average PCB concentrations were below the 2.0 ppm FDA tolerance level in largemouth bass fillets at four of the six locations. For largemouth bass, average lipid concentration ranged considerably between stations.
  - The average concentration of PCBs in hybrid bass fillets samples was greater than the 2.0 mg/kg FDA value at five of the six stations, with the highest average PCB concentration in hybrid bass of 4.36 mg/kg. The average lipid concentration in hybrid bass lake-wide was consistent.
  - The average concentration was greater than the FDA value of 2.0 mg/kg from two of the six sample locations. The highest average PCB concentration was 3.09 mg/kg which is very similar to the 2007 value of 3.11 mg/kg. Percent lipid was observed in 2008 as decreasing with distance from Twelve Mile Creek.
  - During the 2008 monitoring year, mean PCB concentrations in whole-tissue samples of forage fish indicate various degrees of bioaccumulation with four of the nine average values reported to be greater than 2.0 mg/kg

6.6 Site Inspection

The FYR team conducted a site inspection of OU-2 on May 6, 2009. Prior to the site inspection, a FYR team meeting was held with representatives of USEPA, SC DHEC, STC and their consultants. Status of the OUs since the last FYR Report was discussed during this meeting. The team toured portions of Hartwell Lake and Twelve Mile Creek and inspected all three dams. Due to recent rainfall events, sedimentation was observed washing over the top of the dams. The fish advisory signs were observed at several locations near boat ramps or fishing areas. The advisory signs were in clear site and in good condition.

6.7 Interviews

Formal interviews were not conducted as part of this FYR for OU-2; however, a meeting was held with the FYR team in order to discuss the activities and issues at the site since the last FYR Report along with planned activities for OU-2.

Section 7
Technical Assessment

As recommended by USEPA's Comprehensive Five-Year Guidance (OSWER No. 9355.7-03B-P, June 2001, the framework for the technical assessment of the RA centers around answering the following three key questions.

7.1 Question A: Is the remedy functioning as intended by the decision documents?

The major components of the remedy selected in the 1994 ROD for OU-2 include the following:

- Continuation of the existing fish consumption advisory on Lake Hartwell.
- Implementation of a public education program to increase the awareness of the advisory and methods to prepare/cook fish to reduce the quantity of contaminants consumed,
- Continued monitoring of aquatic biota and sediment to support continuance and/or justify modifications to the existing advisory.
- Regular flushing of sediments trapped behind three impoundments on Twelve Mile Creek to: facilitate burial of contaminated sediments further downstream while mitigating adverse impacts to Lake Hartwell water quality

The fish advisory institutional control remains in effect. The public education program was implemented prior to the first five year review. The local community continues to be involved in the site progress, specifically associated with the dam removal. Ongoing monitoring of biota and sediment remains an effective measurement of natural attenuation. Dam removal is expected to take place during the next five year review period.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Not completely. The FGETS bioaccumulation model predicted fish tissue concentrations in the Twelve Mile Creek Arm of Lake Hartwell would decline in response to decreasing water column and surface sediment PCB Concentrations. FGETS predicted largemouth bass concentrations in the Twelve Mile Creek Arm of Lake Hartwell would fall below the 2 mg/kg FDA level in the 2003 to 2005 time frame. Largemouth bass fillets from Twelve Mile Creek embankment remain in the 2-4 mg/kg range, although channel catfish fell below the 2 mg/kg level in 1999 and have remained right at this level since. No apparent fish tissue trends are observed as of 2008 data evaluations. It is anticipated that the dam removal will aid in

continual decline of trends over time. Tissue concentrations seem to have a longer decline lag time. Ongoing evaluations continue at the Plant Site portion of OU-1.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Continued evaluation of the potential for a continuing groundwater to surface water transport pathway from OU- 1 to Town Creek has been investigated. Information gathered from OU-1 investigations is being relied upon to refine the conceptual site model in order to ensure source control to the extent practical.

7.4 Technical Assessment Summary

The site documents review in combination with the site visit and team meeting provided the basis for this technical assessment. Performance monitoring will continue for OU-2 after the dam removal activities. Institutional controls (fish advisory) will remain in effect until fish tissue clean-up criteria for PCBs are met.

Section 8
Issues

Table 5 summarizes the current issues for the OU-2 site.

Table 5
Current Issues for the OU-2 Site

ISSUE	AFFECTS CURRENT PROTECTIVENESS (Yes or No)	AFFECTS FUTURE PROTECTIVENESS (Yes or No)
Source control at OU-1	Yes	Yes
Dam removal to insure natural accumulation of sediments downstream	Yes	Yes

Section 9
Recommendations and Follow-up Actions

Based on the above discussion and findings, the following recommendations are issued for this FYR.

1. SC DHEC to continue to administer the existing fish consumption advisory, and implement modifications as warranted by the annual aquatic biota and sediment monitoring program.
2. Continue the annual aquatic biota and sediment monitoring program specified by the 1994 ROD. Modifications to annual monitoring program as recommended by USEPA-NRMRL/NERL were implemented during the 2004 sampling event.
3. Support the NRDA settlement CD regarding dam demolition and Twelve Mile Creek stream corridor restoration as requested by the Department of Justice (DOJ) and the NRTs and documented in the September 3, 2009 ESD to the 1994 ROD.
4. Continue to evaluate the potential groundwater to surface water pathway at the Sangamo Plant Site and Town Creek discharge point and assure follow-up investigations will be implemented as appropriate.
5. Inspect and maintain fish advisory signs installed in April 2009.

Table 6 provides recommendations to address the current issues at the OU-2 Portion of the Sangamo site.

Table 6
Recommendations to Address Current Issues at the OU-2 Site

ISSUE	RECOMMENDATIONS/ FOLLOW-UP ACTIONS	PARTY RESPONSIBLE	OVERSIGHT AGENCY	MILESTONE DATE	AFFECTS PROTECTIVENESS? (YES OR NO)	
					CURRENT	FUTURE
Dam removal to enhance natural sedimentation	Consistency with the CD and ESD at to allow dam removal to proceed	NRT, STC	SC DHEC	09/03/10	Yes	Yes
Maintenance of fish advisory signs	Inspect and maintain fish advisory signs annually	STC	USEPA	Annually, beginning April 2010	Yes	Yes

Section 10
Protectiveness Statement

The MNR/Institutional Controls remedy for OU-2 is considered protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future.

The remedy at OU 2 currently protects human health and the environment because is considered adequately protective of human health and the environment while long-term monitoring of aquatic biota and sediments continue in the future. Remedial technologies for accelerating cleanup at the Plant Site portion of OU-1 areas will be implemented in the near future for the Plant Site. Since operation and maintenance of these systems will be optimized to meet established performance standards, this site is considered adequately protective of human health and the environment. However, in order for the remedy to be protective in the long-term, the following actions need to be taken:

- Dam removal and stream restoration at OU-2.
- Evaluation of remedial technologies for accelerating cleanup at Plant Site portion of OU-1 to evaluate the potential for a groundwater to surface water exposure pathway.

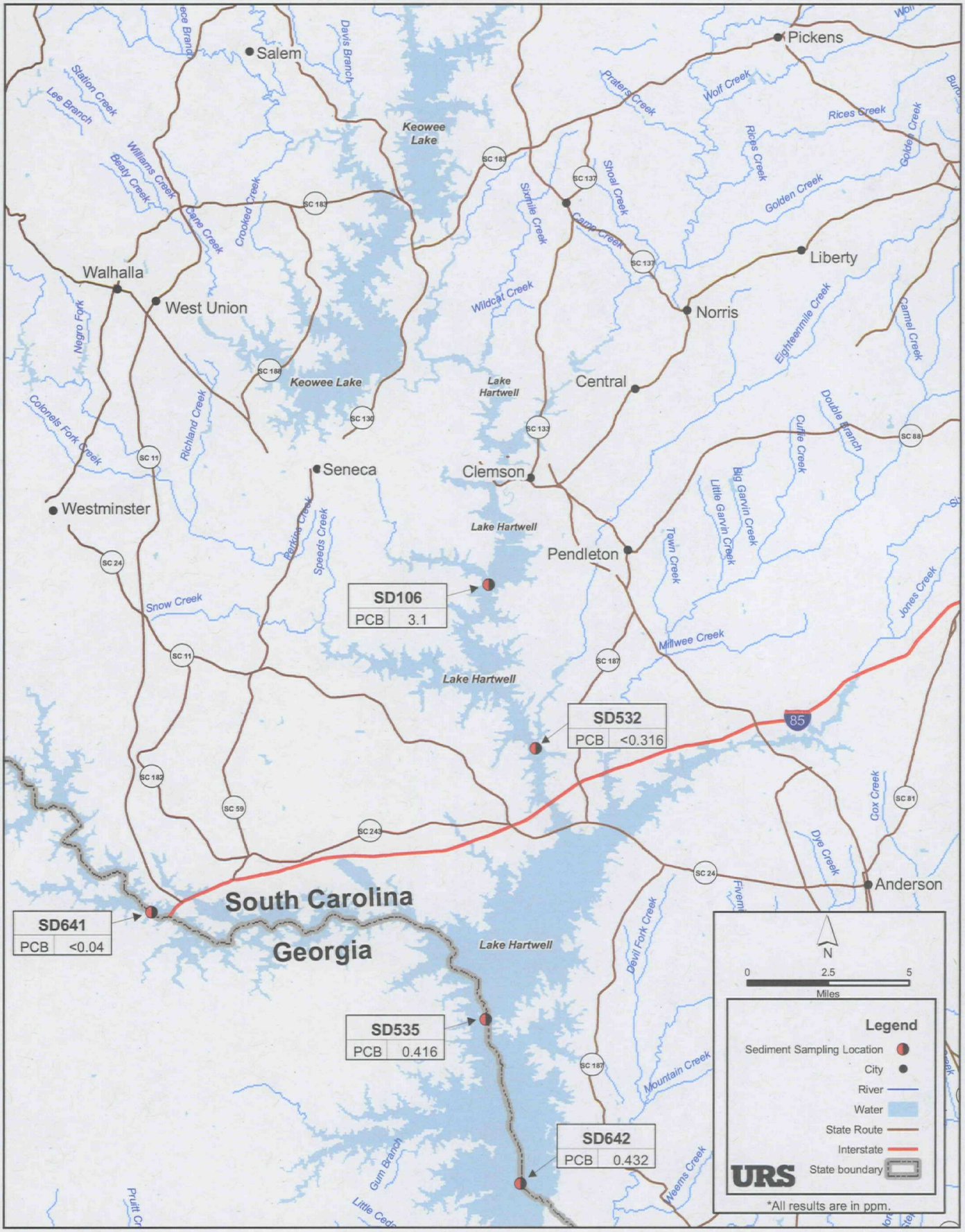
Section 11
Next Review

Pursuant to statutory requirements, the next FYR Report for this site will he conducted five years from the approval date of this document.

Appendix A
Site Maps

Figure 1

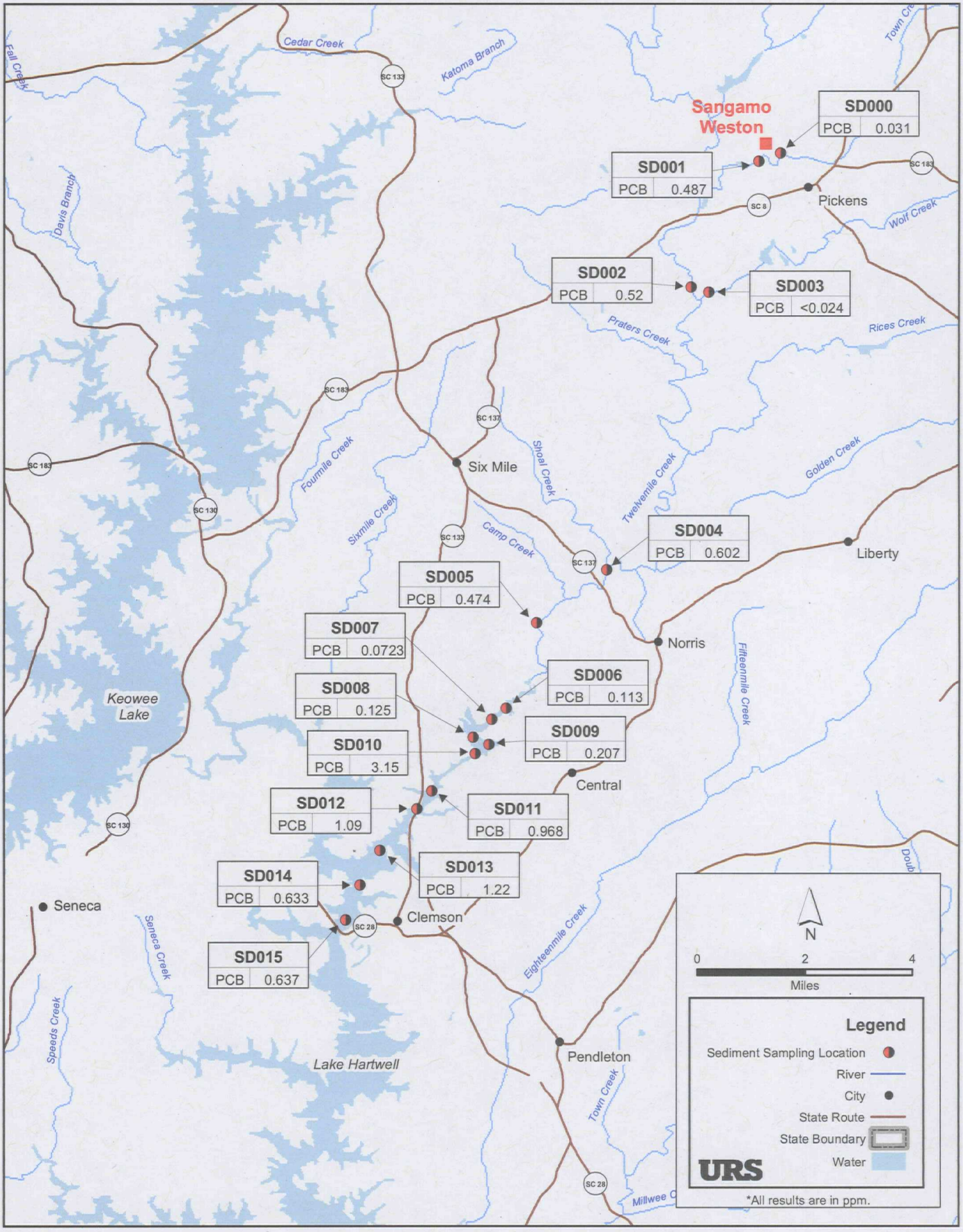
Sediment Sampling Locations - 2008
Lake Hartwell



file: G:/Schlumberger/lake_hartwell_sc/deliverables/2008/fig1-sediment-sampling.mxd

Figure 2

Sediment Sampling Locations - 2008
Twelvemile Creek Watershed



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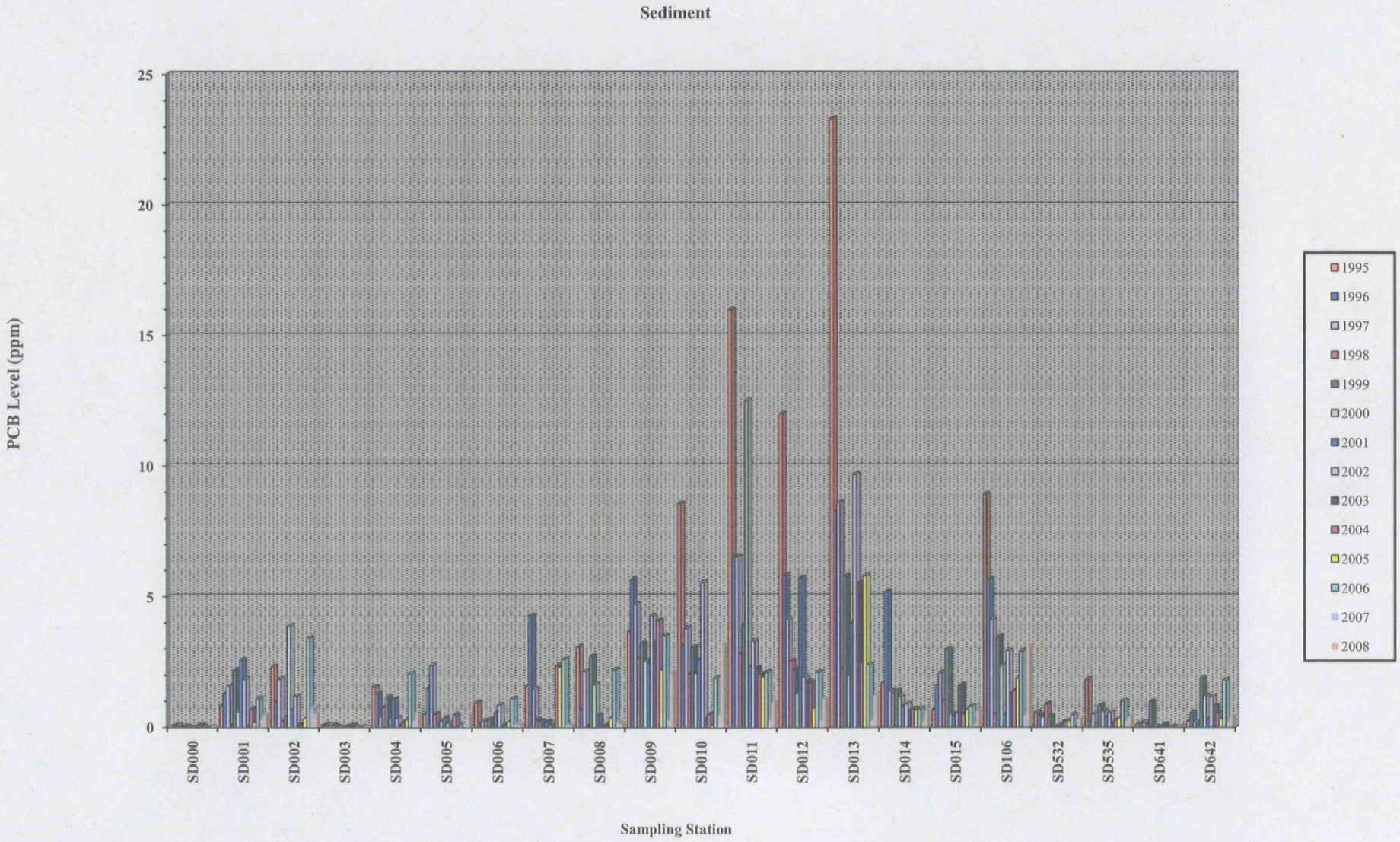


Figure 3. PCB Levels in Sediment Samples (1995-2008), Lake Hartwell OU2 Fish and Sediment Study.

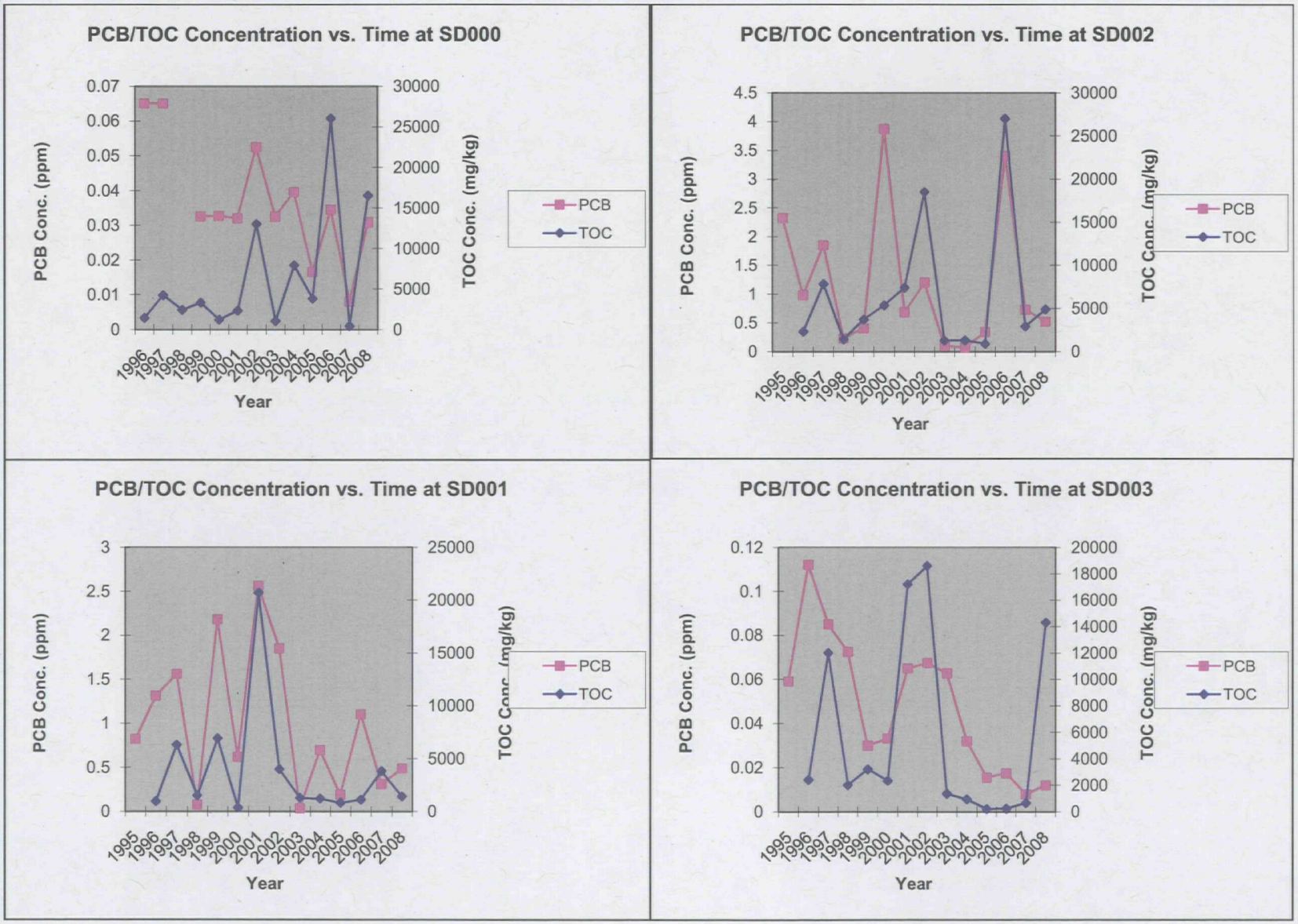


Figure 3a. PCB/TOC Concentration by Sample Year SD-000 to SD-003 (1995-2008), Lake Hartwell OU2 Fish Study.

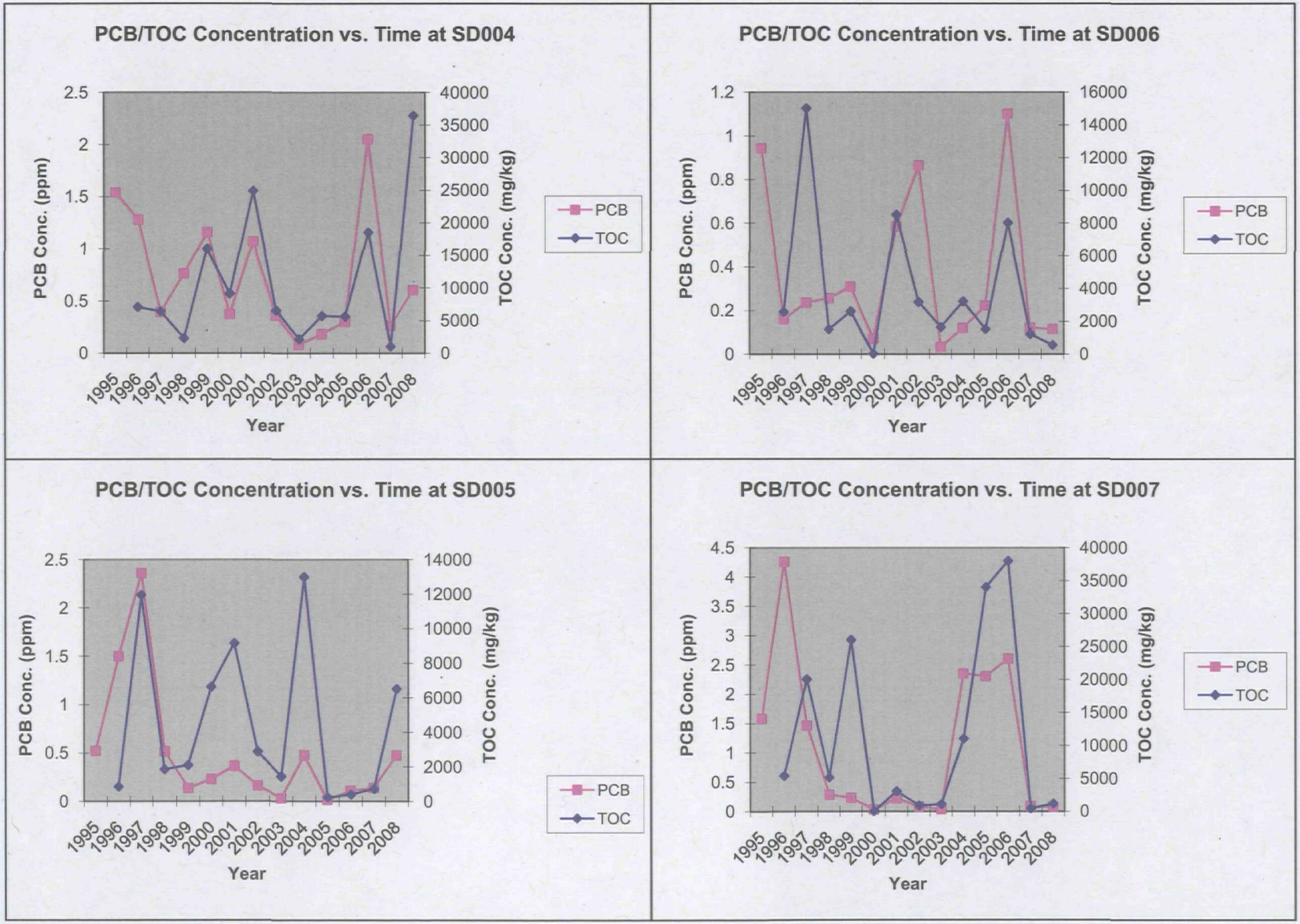


Figure 3b. PCB/TOC Concentration by Sample Year SD-004 to SD-007 (1995-2008), Lake Hartwell OU2 Fish Study.

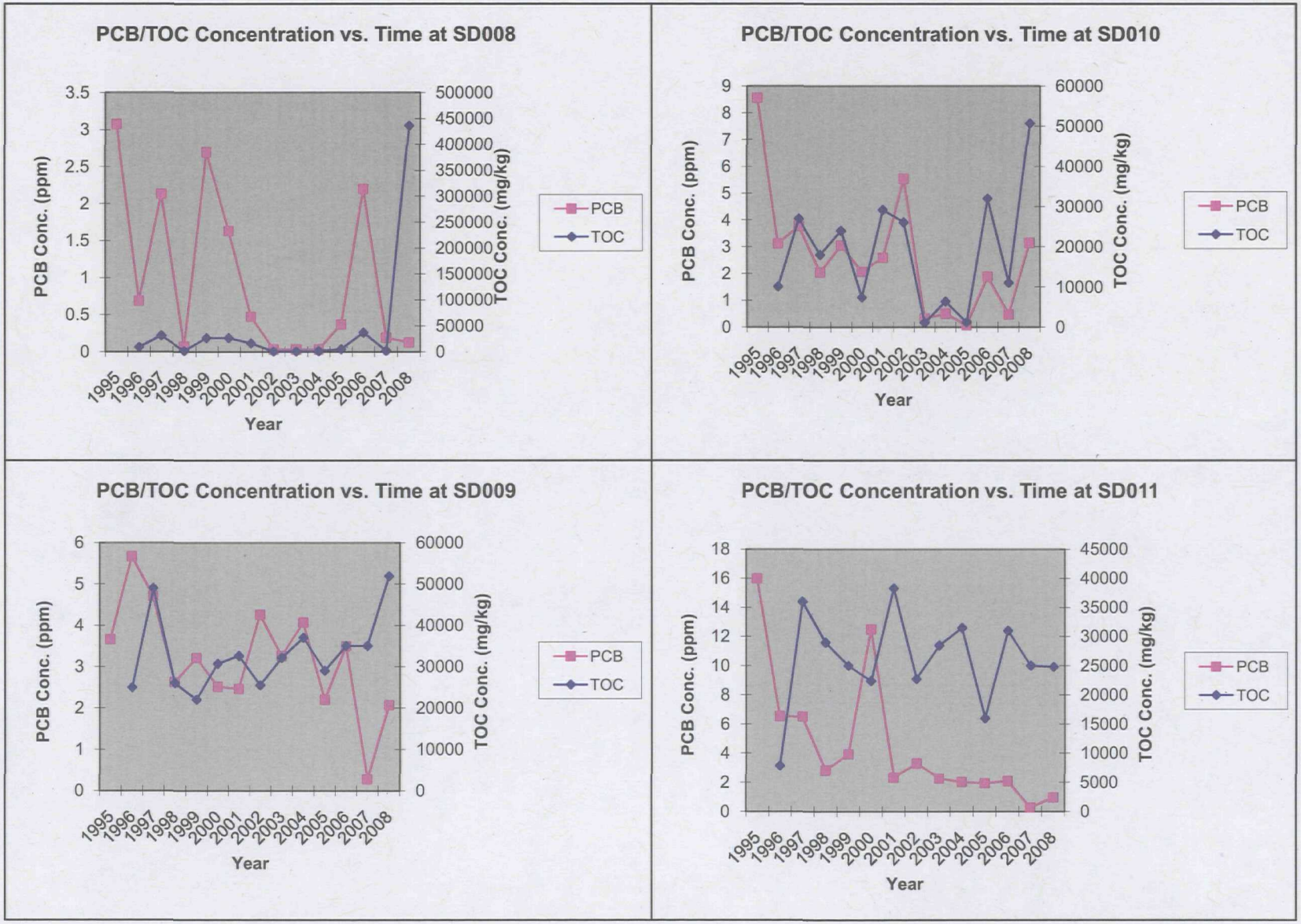


Figure 3c. PCB/TOC Concentration by Sample Year SD-008 to SD-011 (1995-2008), Lake Hartwell OU2 Fish Study.

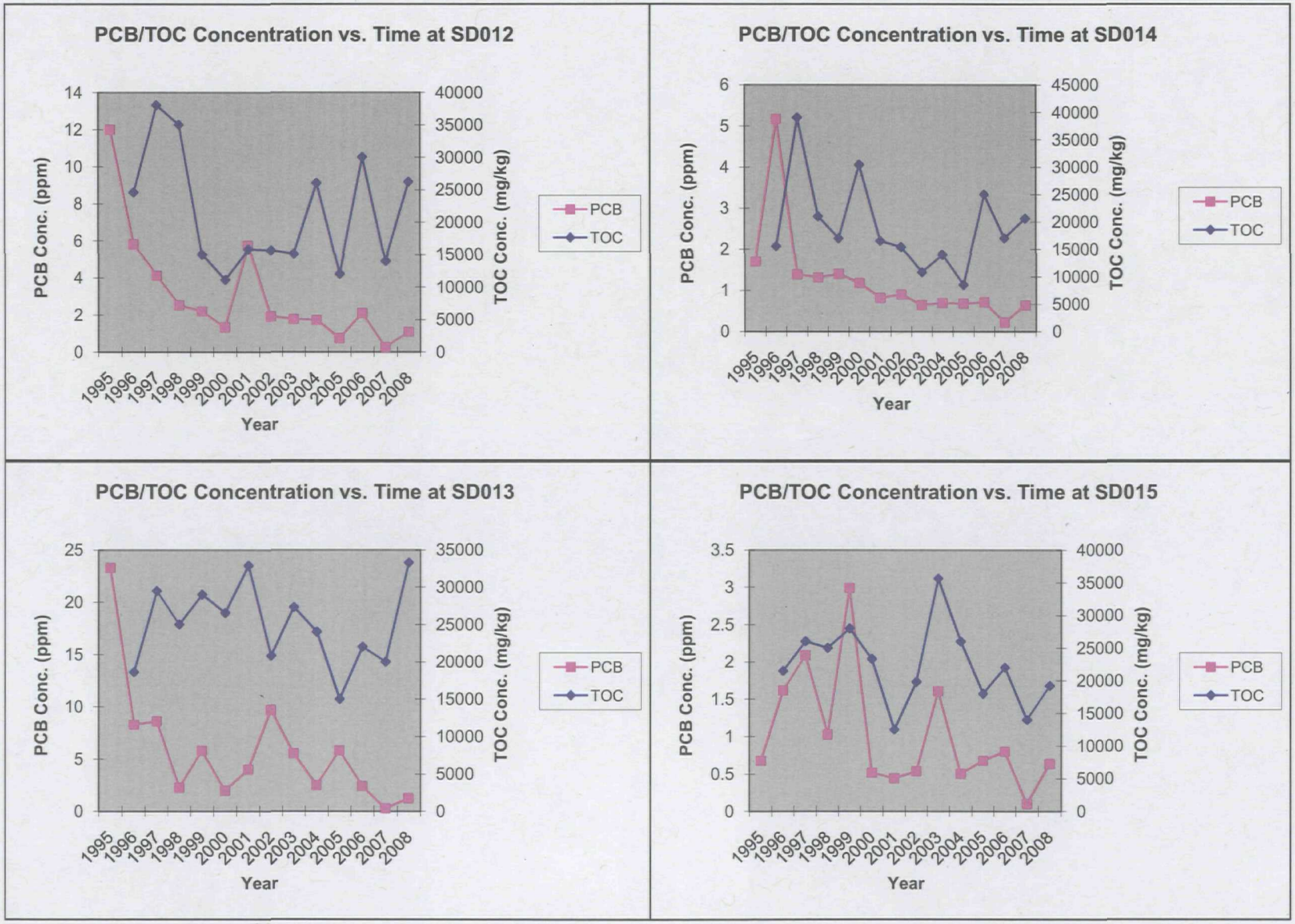


Figure 3d. PCB/TOC Concentration by Sample Year SD-012 to SD-015 (1995-2008), Lake Hartwell OU2 Fish Study.

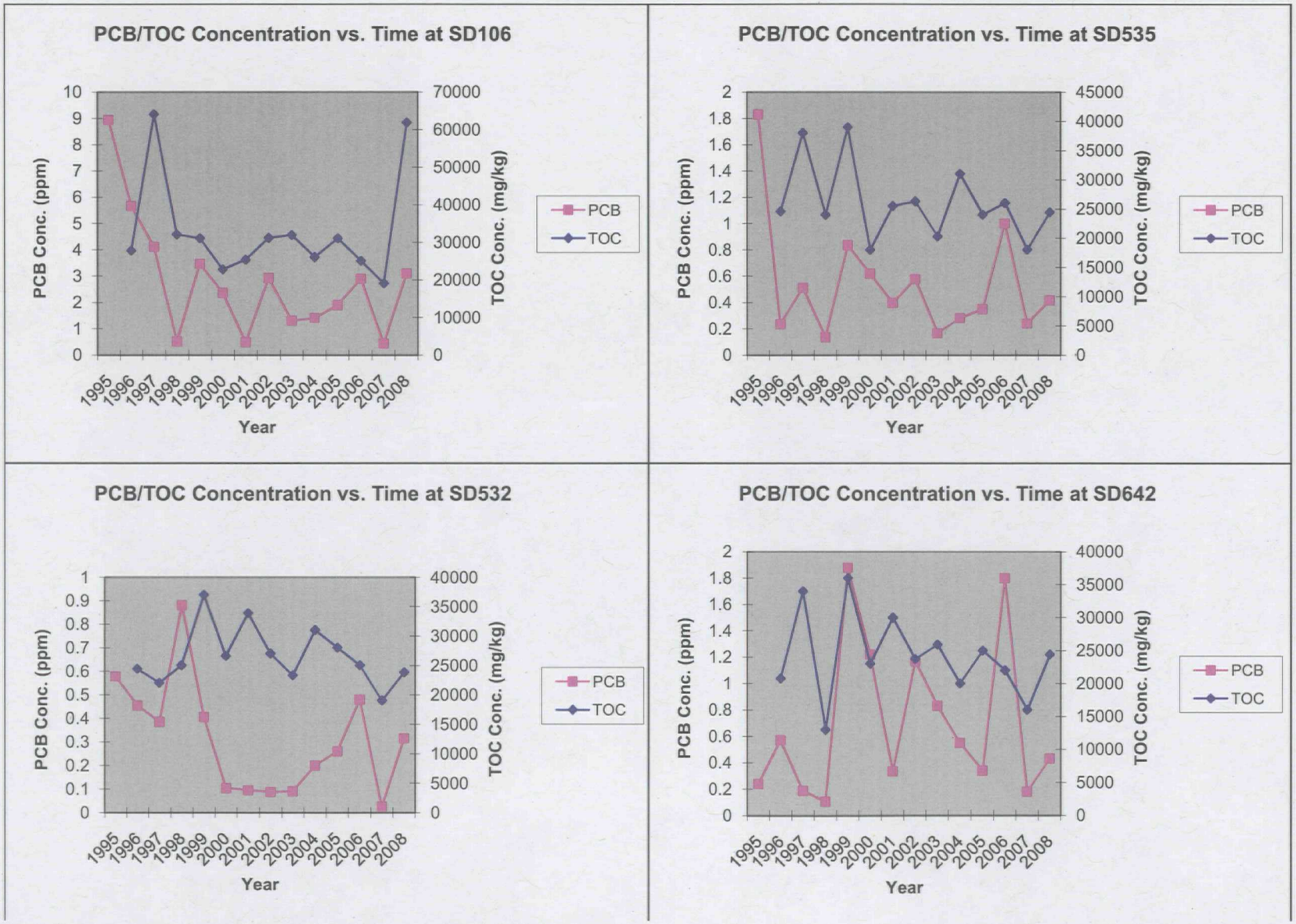


Figure 3e. PCB/TOC Concentration by Sample Year SD-106, SD-532, SD-535, SD-642 (1995-2008), Lake Hartwell OU2 Fish Study.

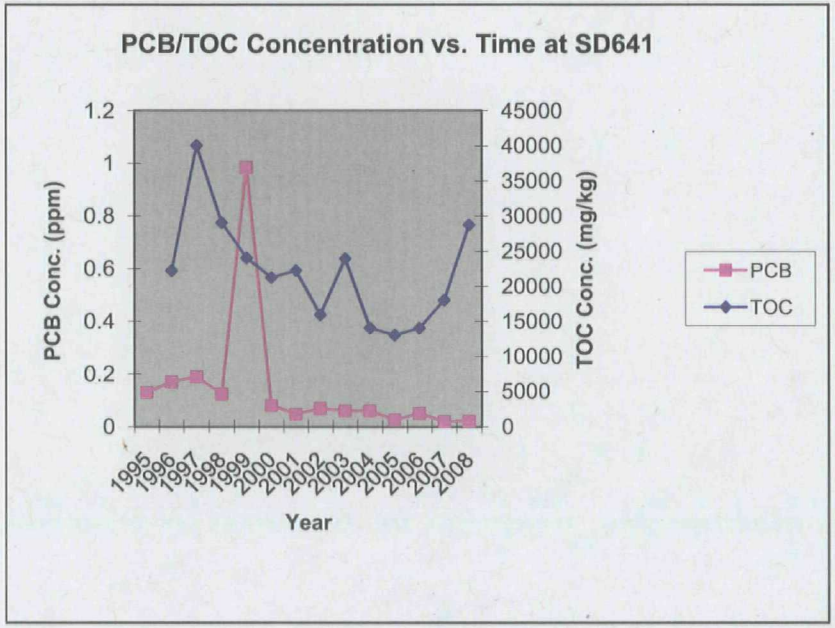


Figure 3f. PCB/TOC Concentration by Sample Year SD-641 (1995-2008), Lake Hartwell OU2 Fish Study.

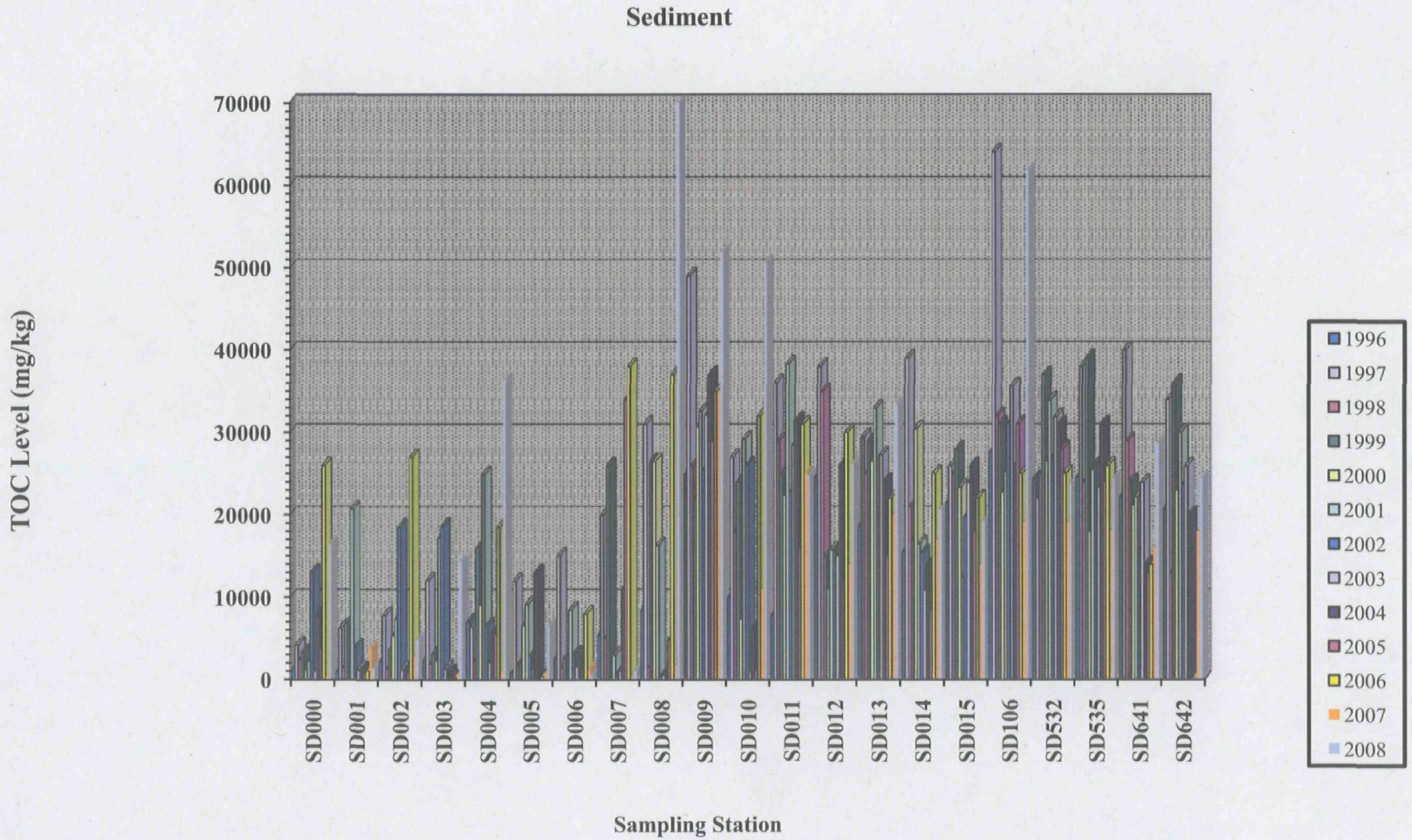
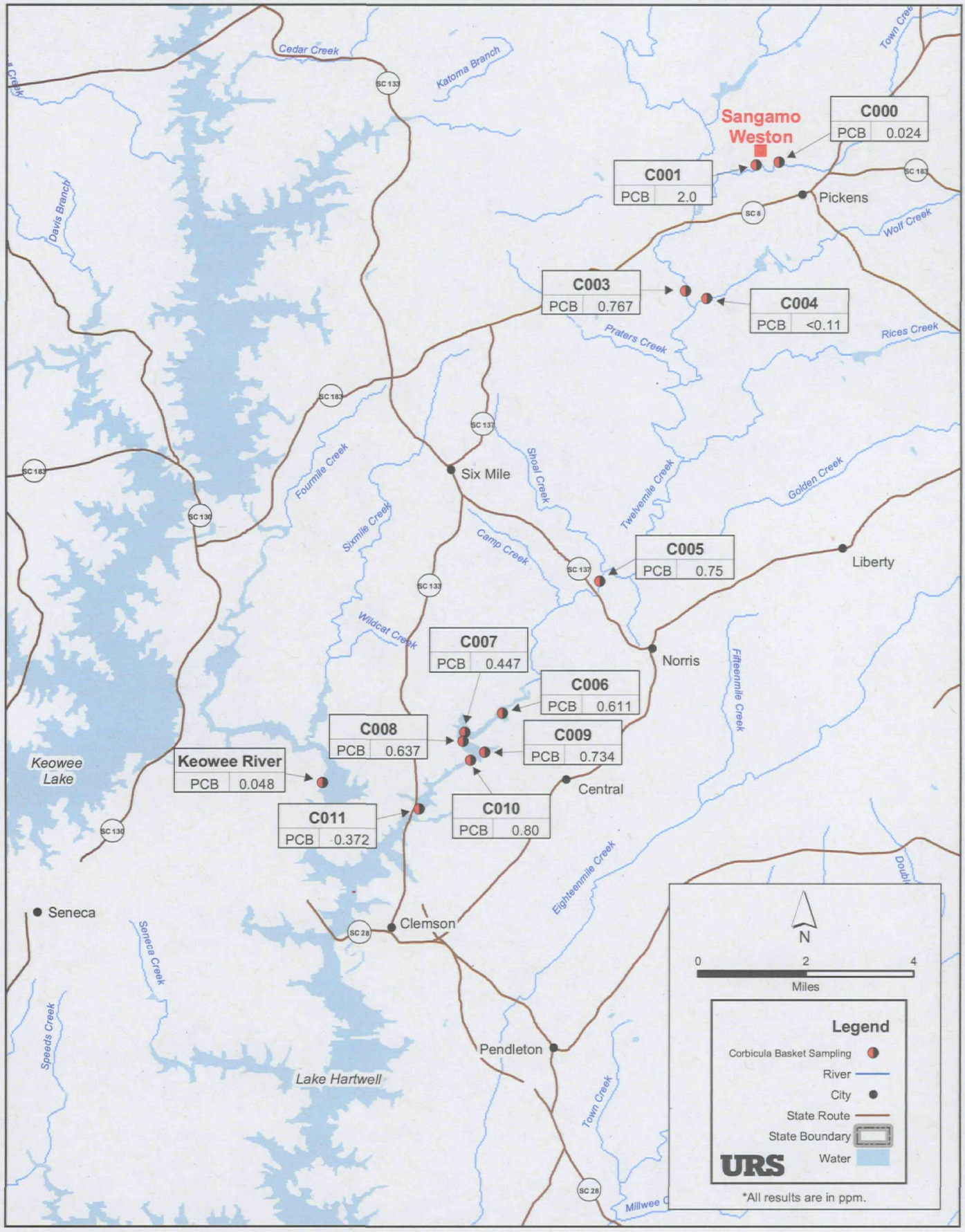


Figure 4. TOC Levels in Sediment Samples (1996-2007), Lake Hartwell OU2 Fish and Sediment Study.

Figure 5

Corbicula Sample Locations - 2008
Twelvemile Creek and Twelvemile Arm



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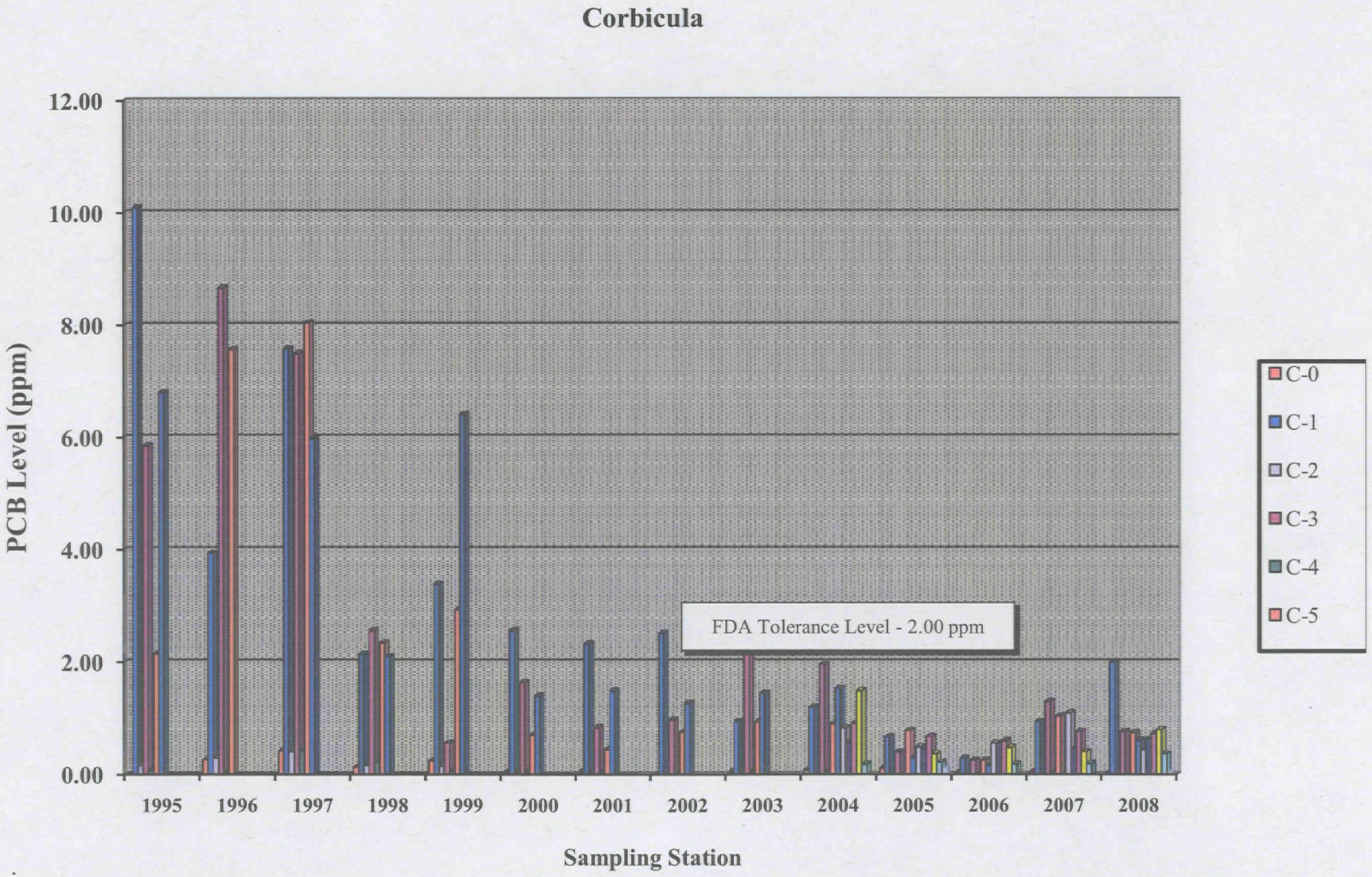


Figure 6. PCB Levels in *Corbicula* Samples (1995-2008) Lake Hartwell OU2 Fish Study

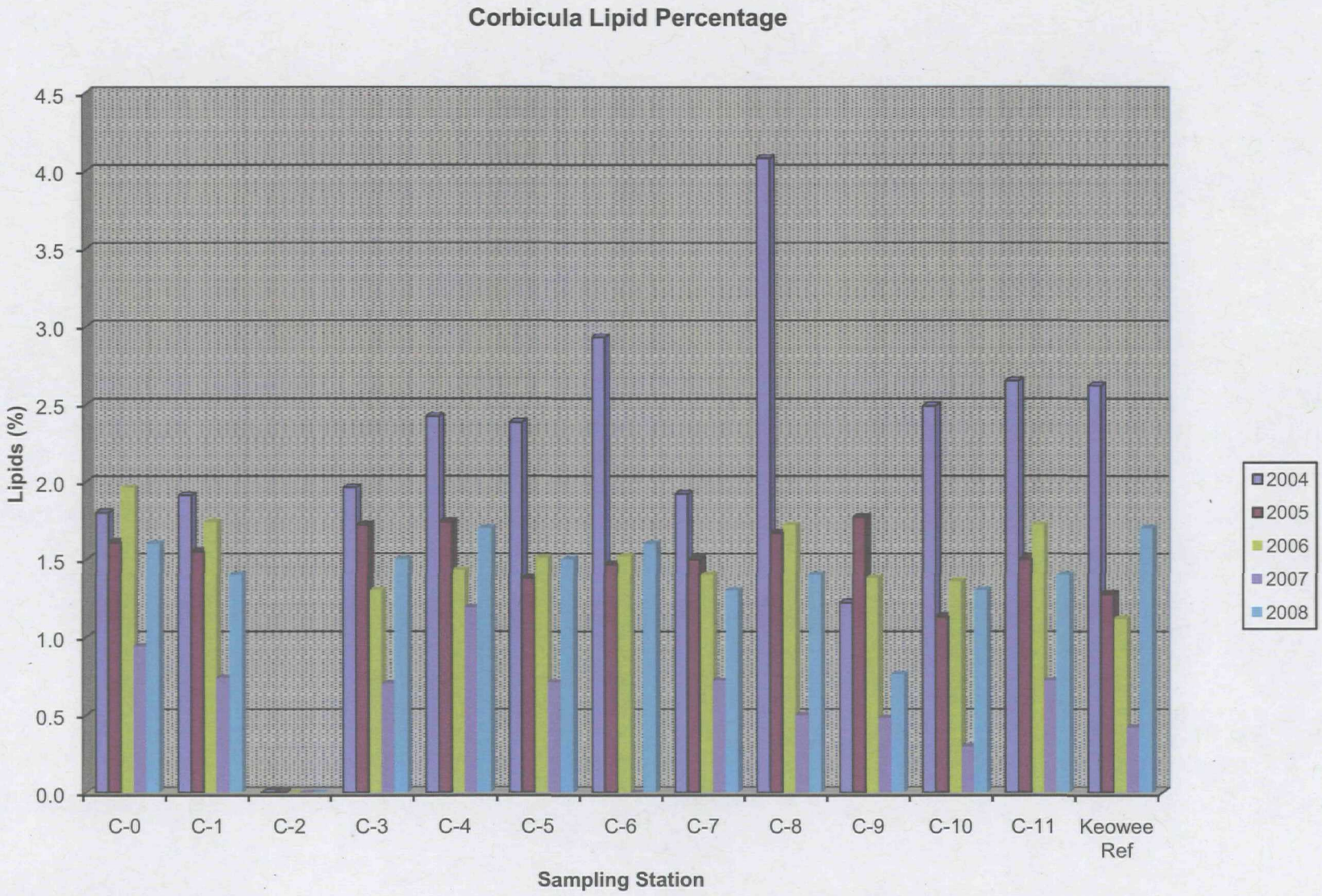
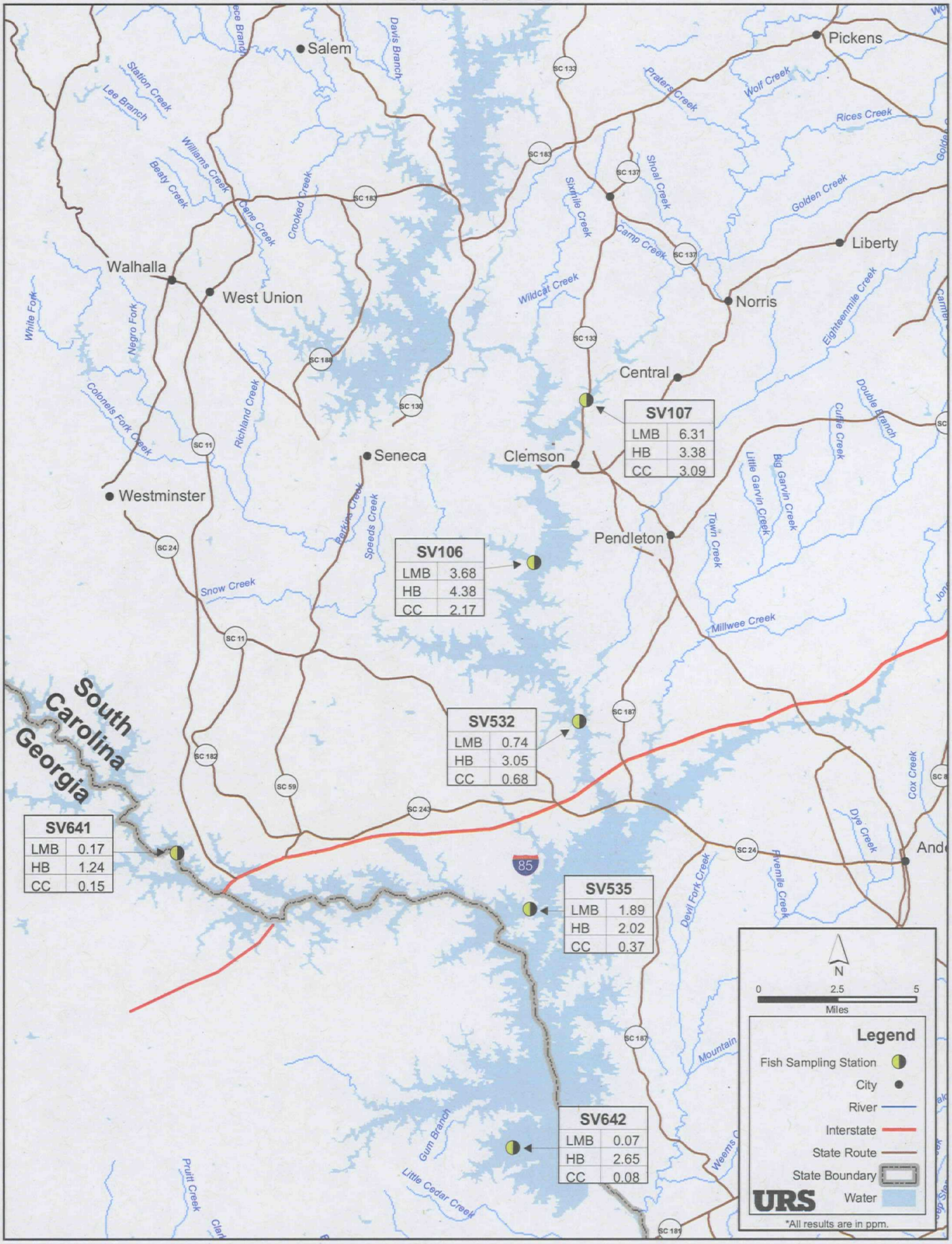


Figure 6a. Lipid Percentage in Corbicula Samples (1995-2008) Lake Hartwell OU2 Fish Study

Figure 7

Fish Sampling Stations - 2008
Lake Hartwell



file: G:\Schlumberger\lake_hartwell_sc\deliverables\2008\fig7-fish-sampling.mxd

Figure 7a. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartwell Station SV-107.

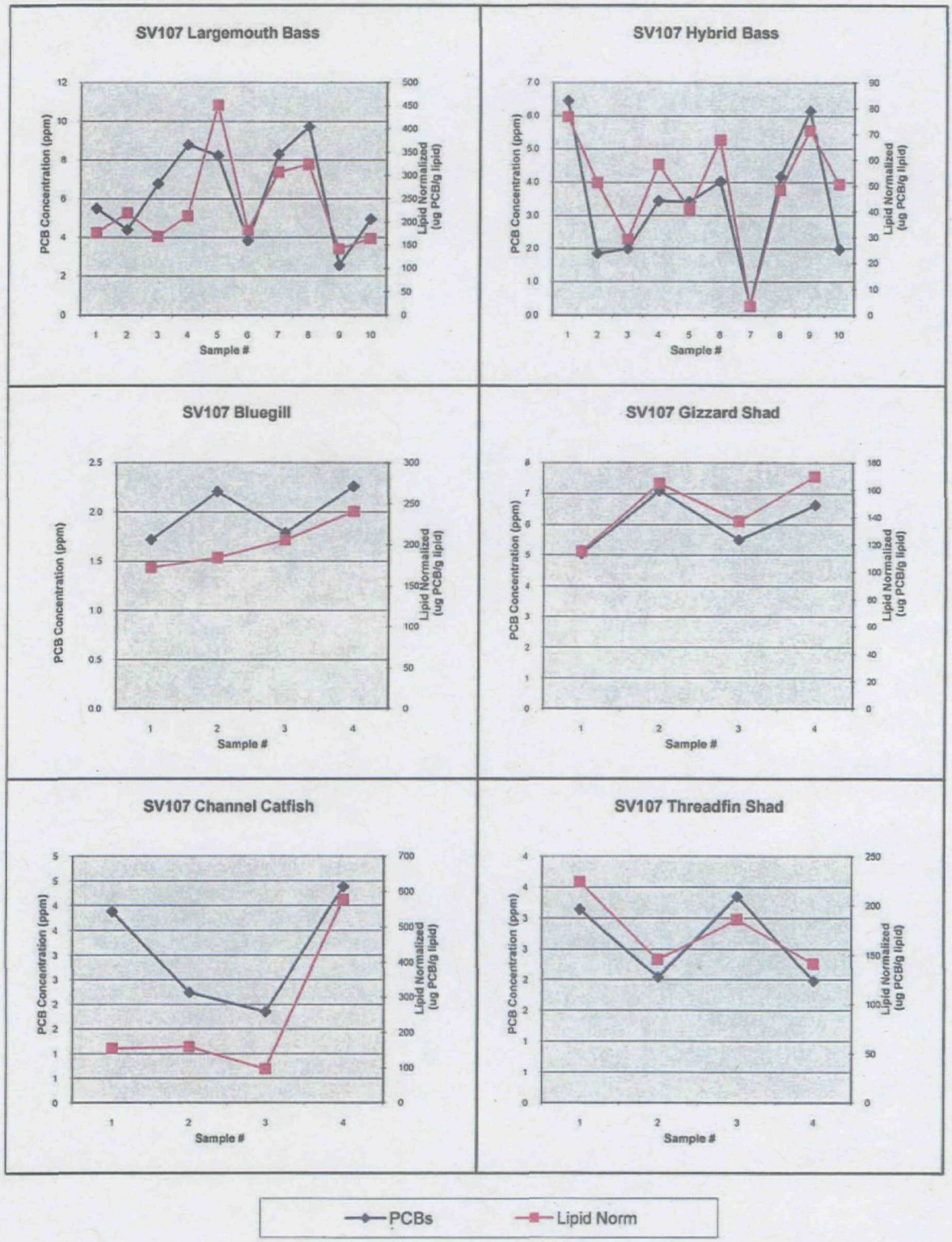


Figure 7b. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartwell Station SV-106.

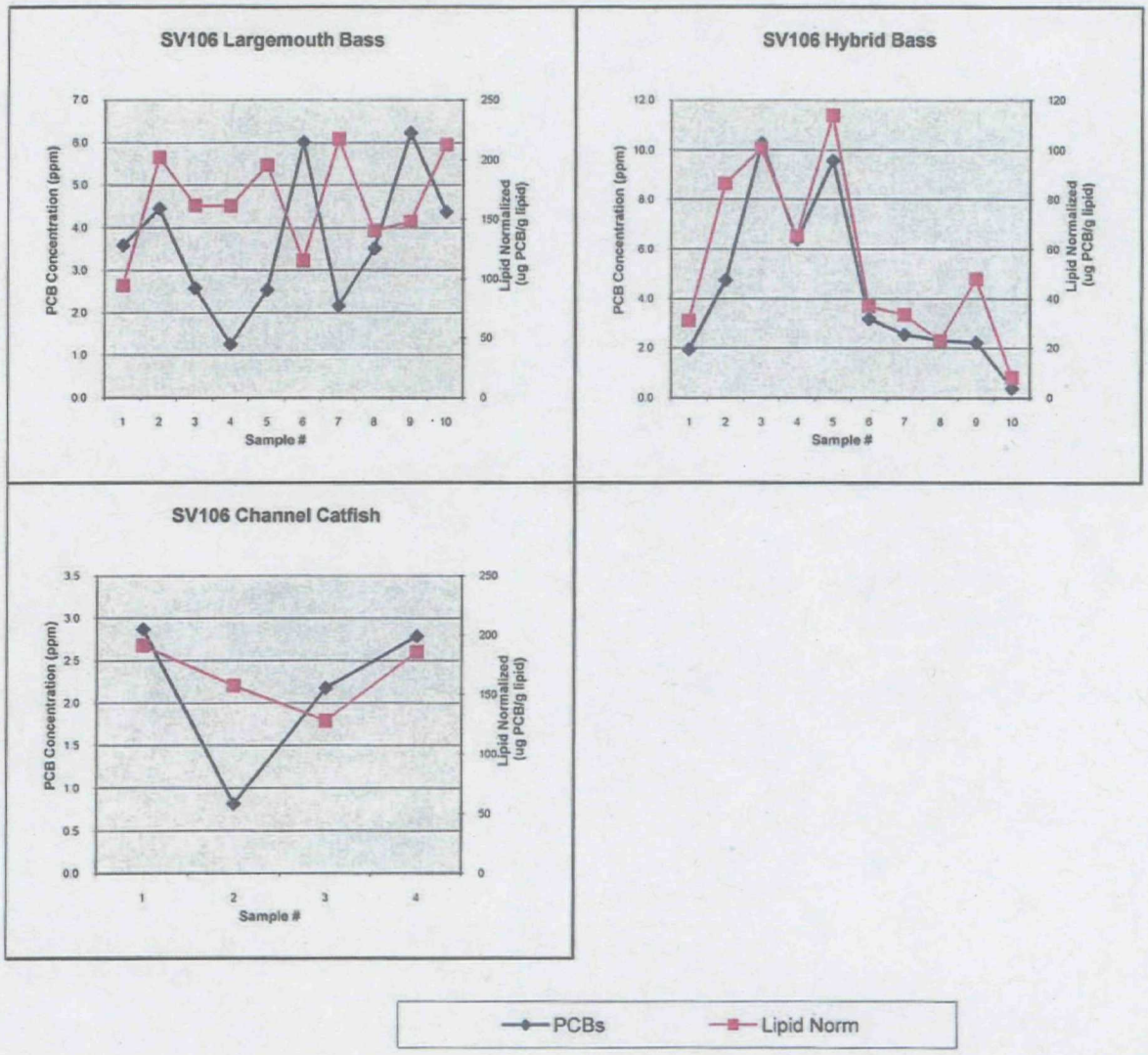


Figure 7c. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartwell Station SV-532.

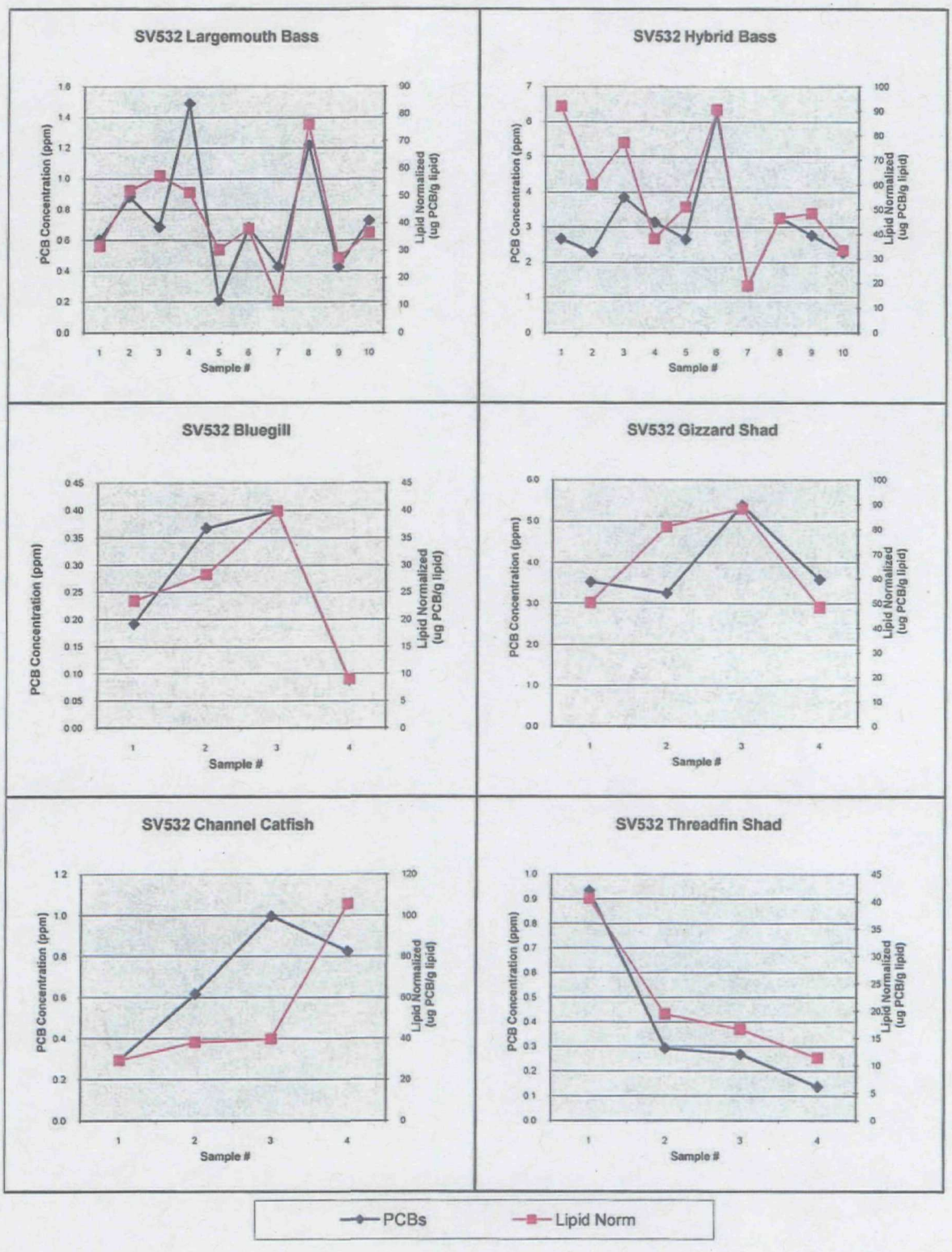


Figure 7d. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartwell Station SV-535.

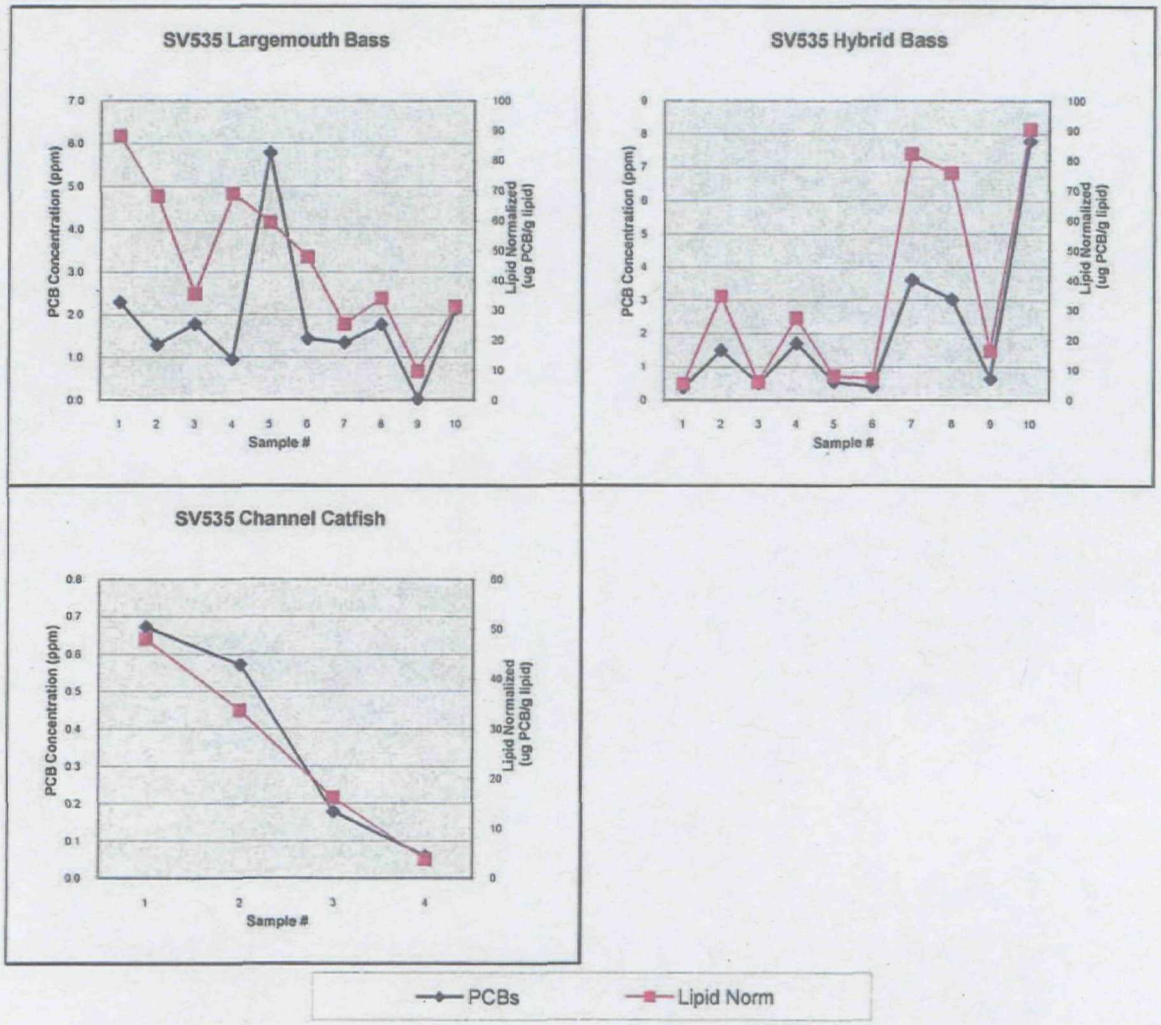


Figure 7e. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartwell Station SV-641.

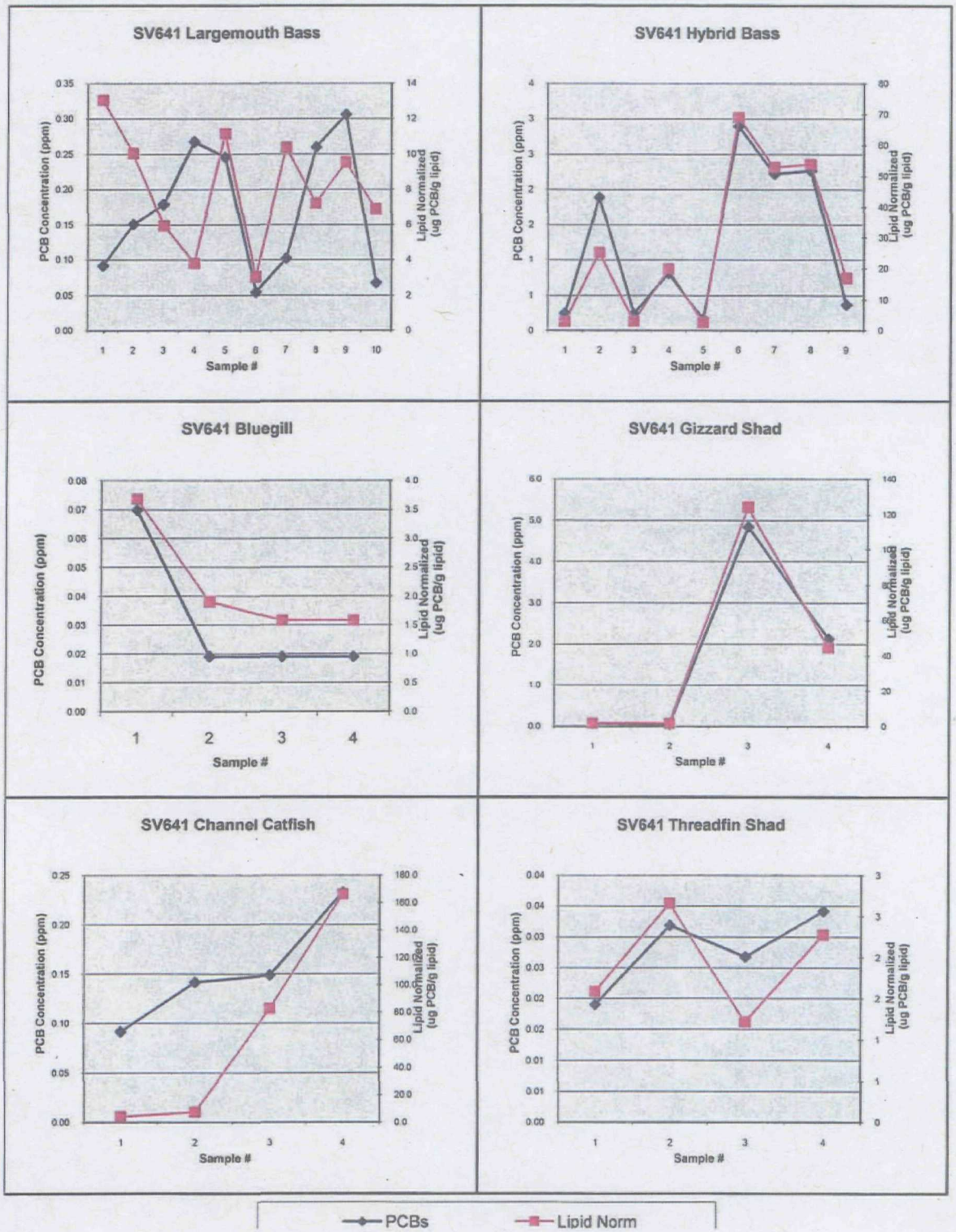
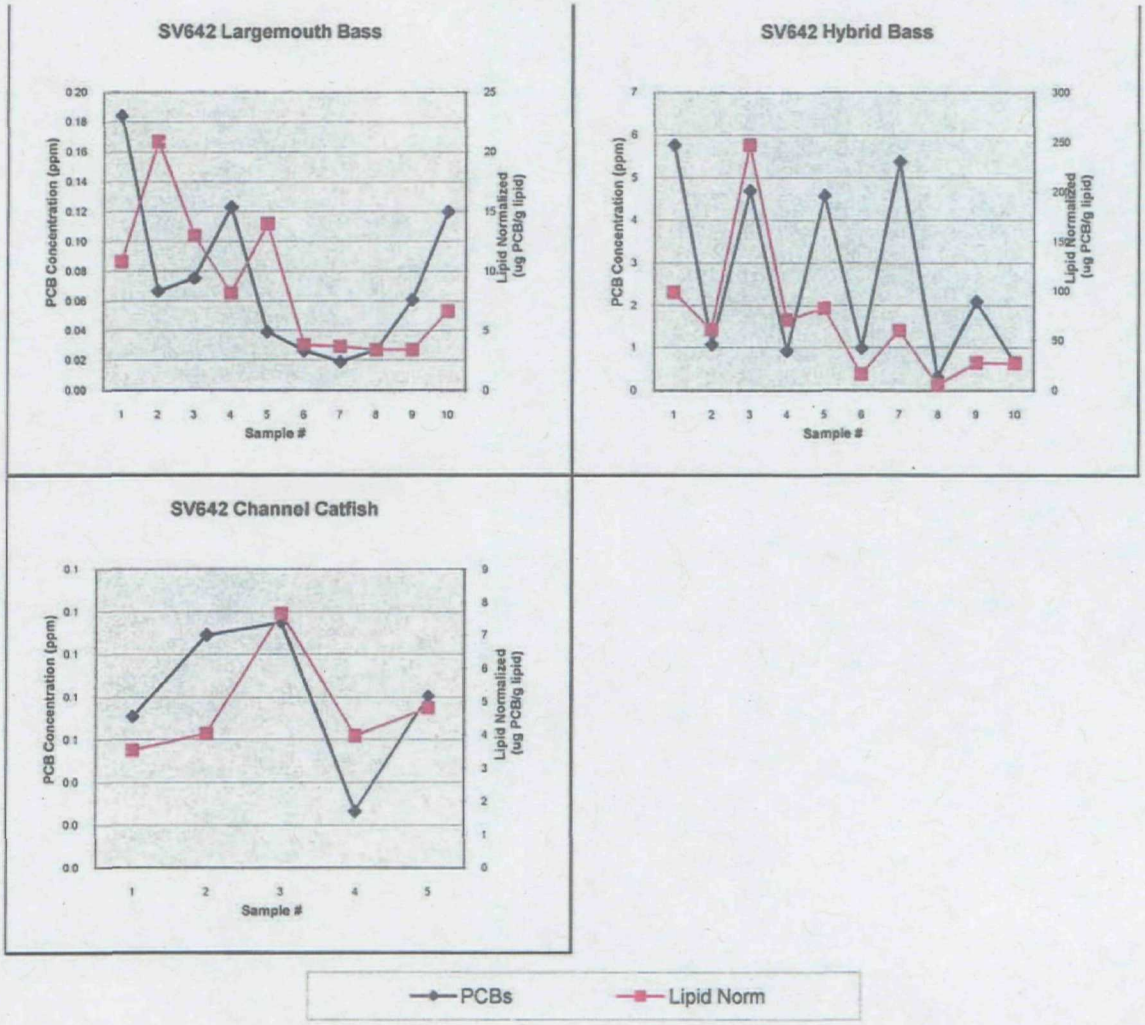


Figure 7f. Lipid Normalized PCB Concentrations in Fish Samples (2008), Lake Hartw Station SV-642.



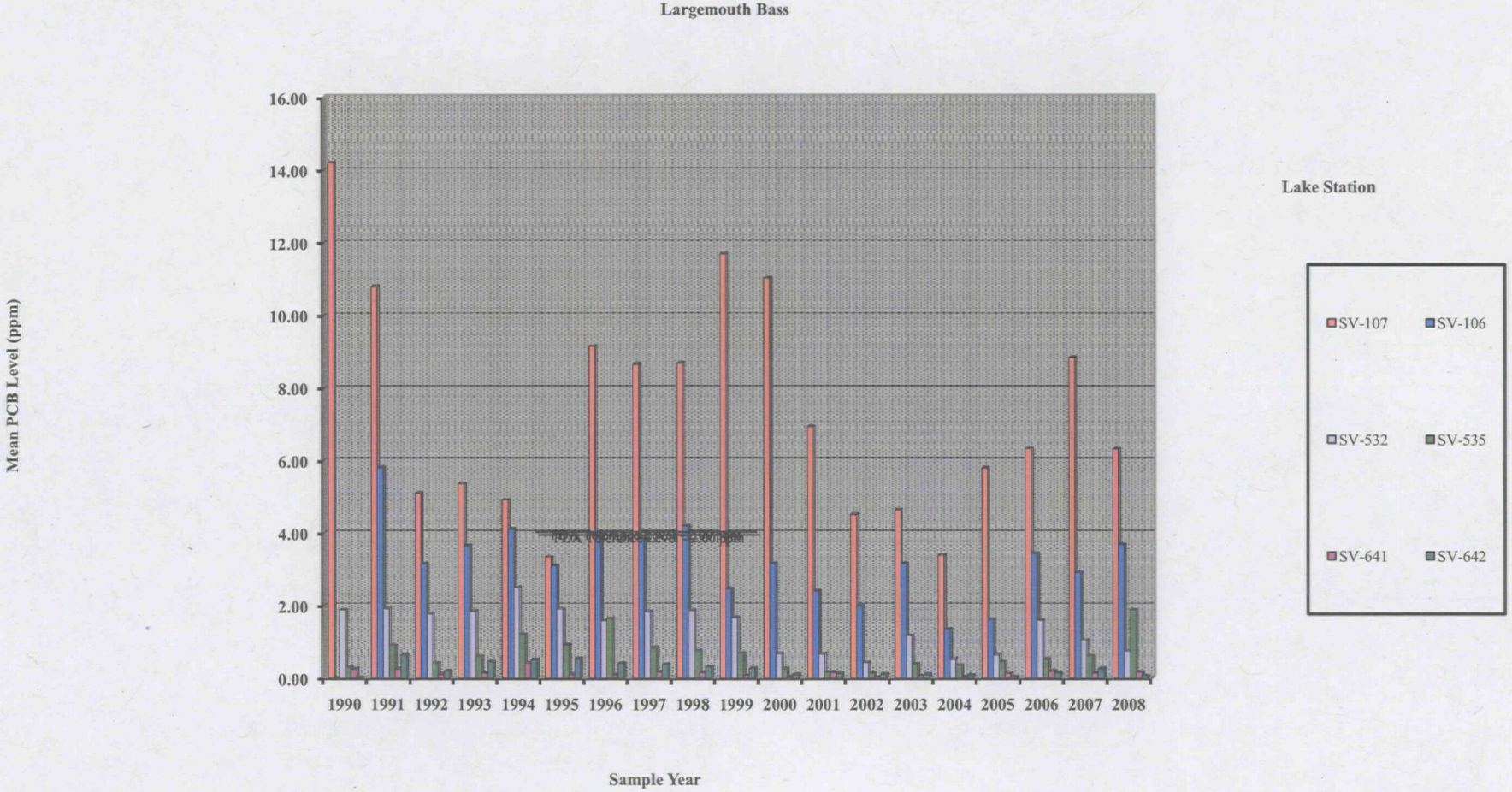


Figure 8. PCB Levels in Largemouth Bass Samples (1990-2008) Lake Hartwell OU2 Fish Study.

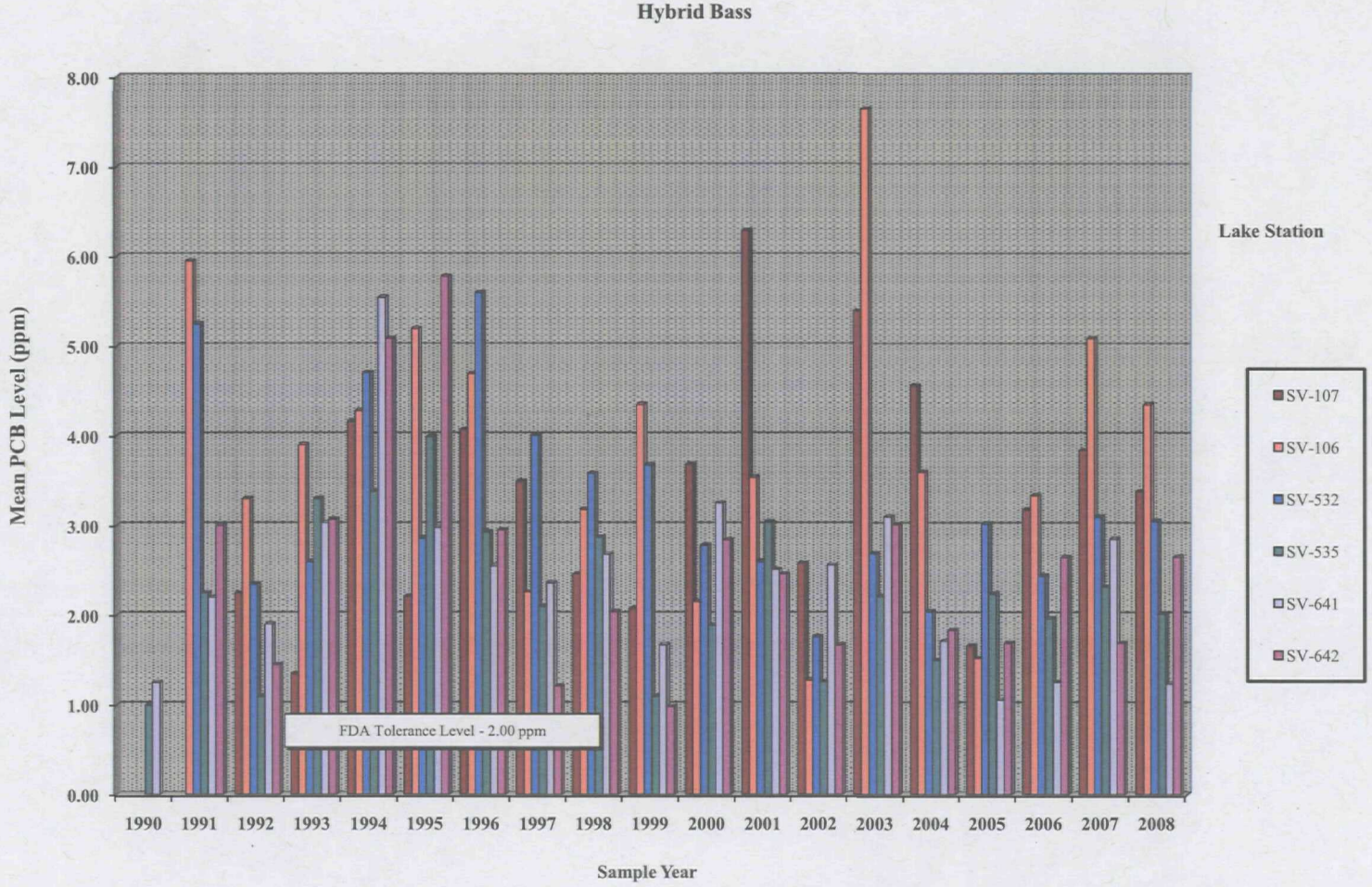


Figure 9. PCB Levels in Hybrid Bass Samples (1990-2008), Lake Hartwell OU2 Fish Study.

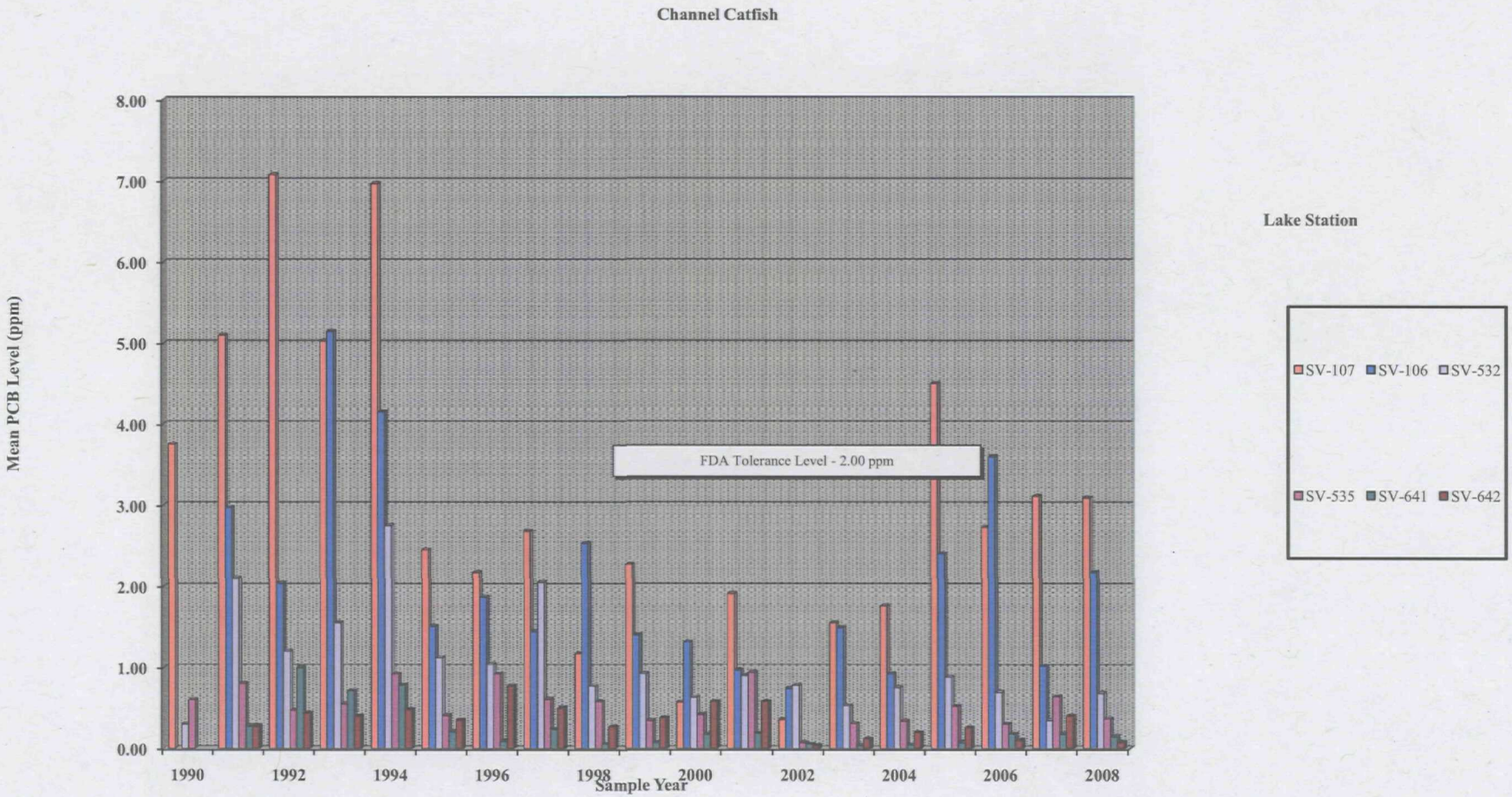


Figure 10. PCB Levels in Channal Catfish Fillet Samples (1990-2008), Lake Hartwell OU2 Fish Study.

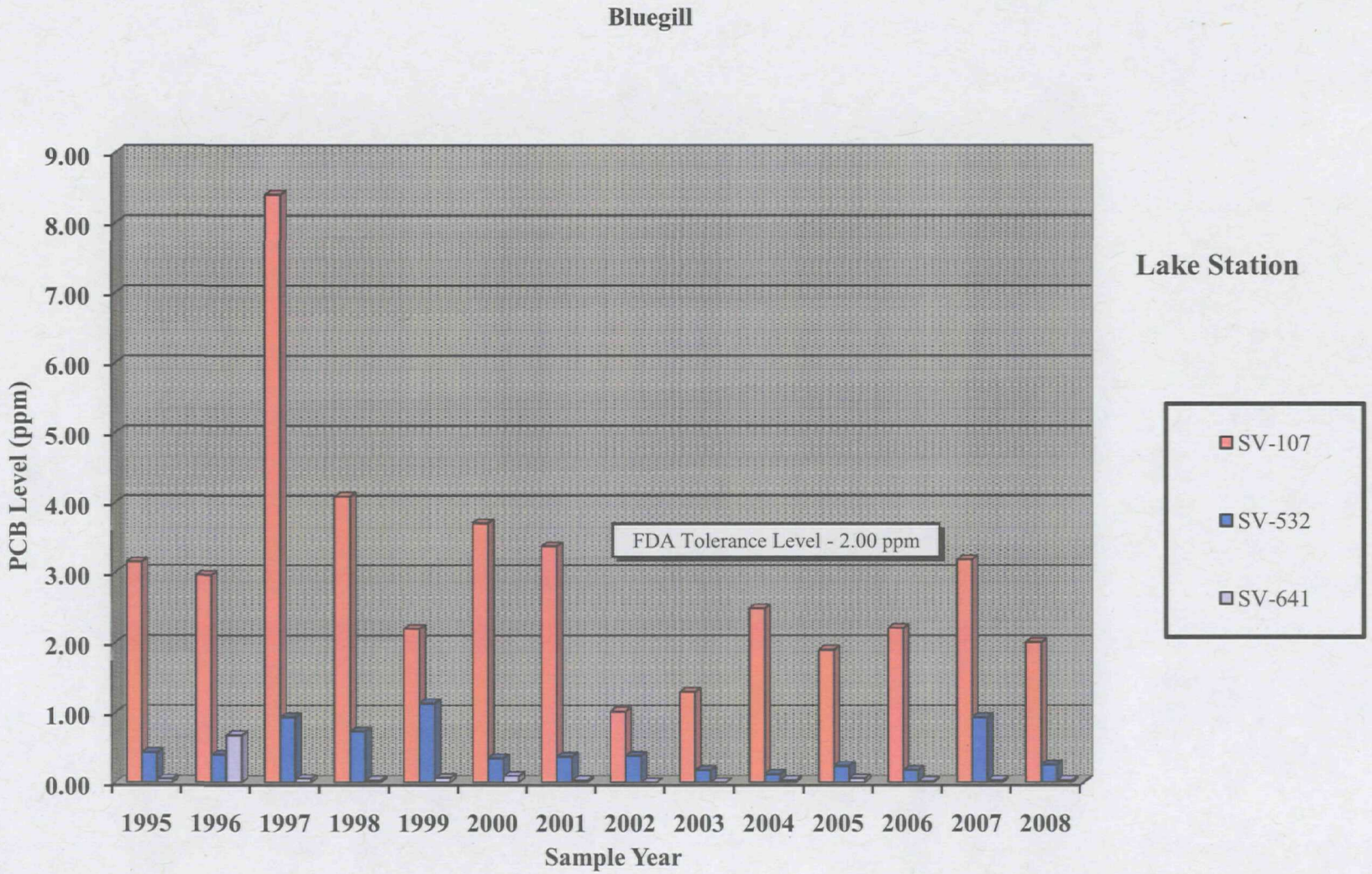
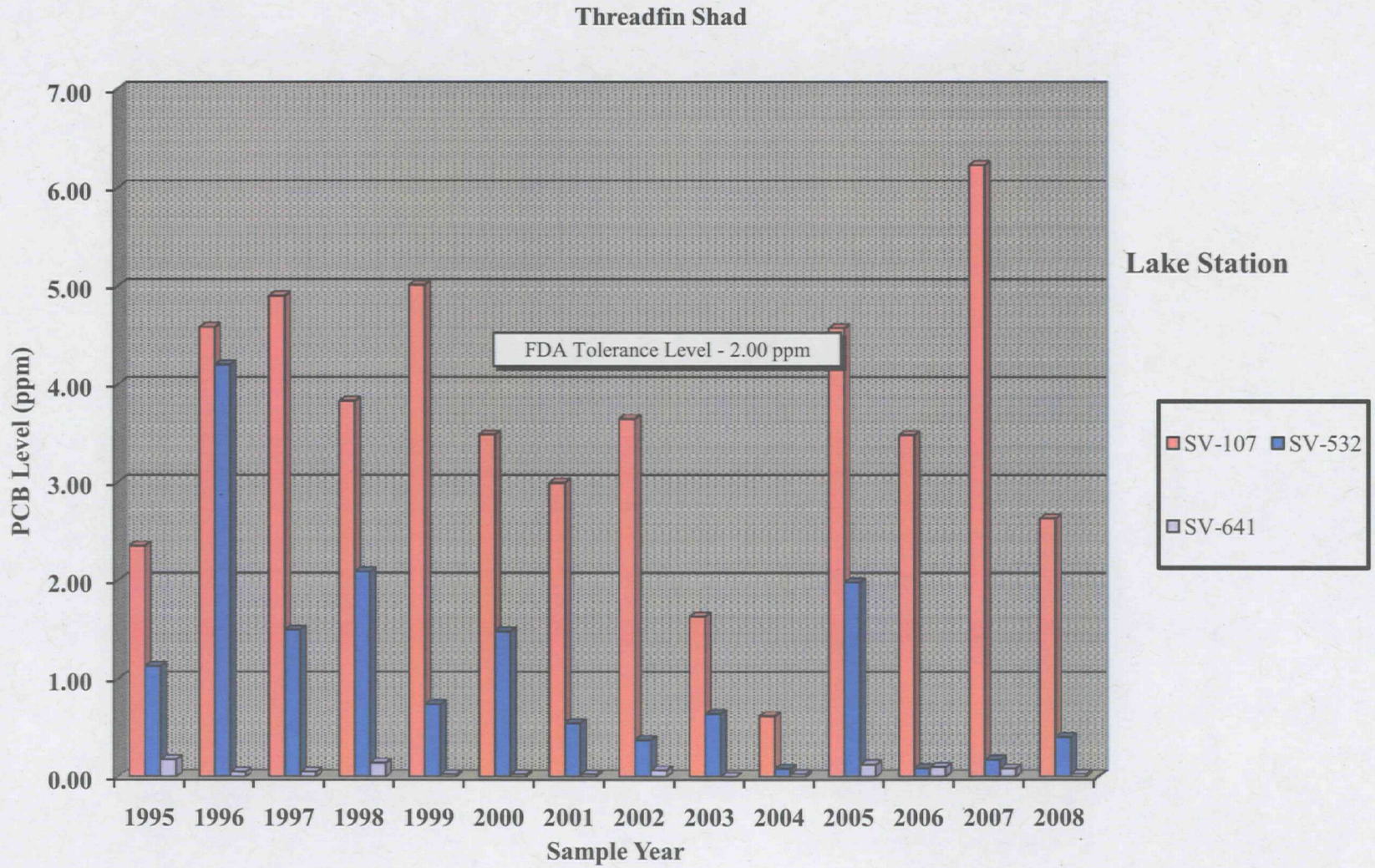


Figure 11. PCB Levels in Bluegill Composite Samples (1995-2008), Lake Hartwell OU2 Fish Study



*NS: No Sample Taken in 2003 @ SV-641

Figure 12. PCB Levels in Threadfin Shad Composite Samples (1995-2008), Lake Hartwell OU2 Fish Study

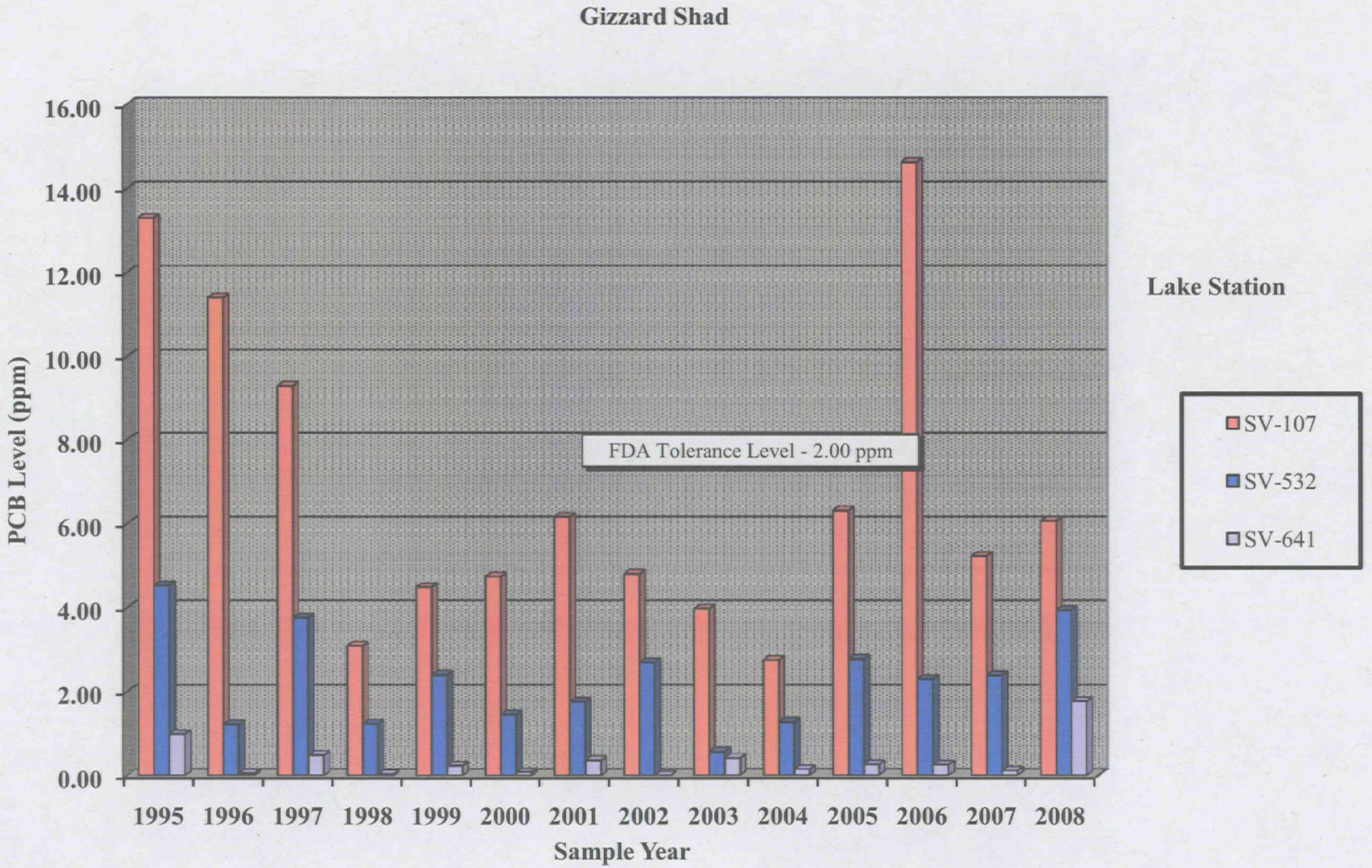


Figure 13. PCB Levels in Gizzard Shad Composite Samples (1995-2008), Lake Hartwell OU2 Fish Study.

Appendix B
Data Summary Tables

Table 1. Lake Hartwell OU2 Sediment Results - Spring 2008

Sample Number	Date Sampled	Aroclor Identification- ug/g							Total PCB - µg/g	TOC mg/kg
		1016	1221	1232	1242	1248	1254	1260		
SD000	5/1/2008	<0.018	<0.018	<0.018	<0.018	0.031	<0.018	<0.018	0.031	16500
SD001	5/1/2008	<0.016	<0.016	<0.016	<0.016	0.398	0.088	<0.016	0.487	1400
SD002	5/1/2008	<0.019	<0.019	<0.019	<0.019	0.255	0.237	0.029	0.520	4890
SD003	5/1/2008	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	<0.024	14300
SD004	5/1/2008	<0.027	<0.027	<0.026	<0.026	0.290	0.278	0.034	0.602	36400
SD005	5/1/2008	<0.022	<0.022	<0.022	<0.022	0.198	0.248	0.029	0.474	6510
SD006	5/1/2008	<0.016	<0.016	<0.016	<0.016	0.077	0.036	<0.016	0.113	530
SD007	5/1/2008	<0.016	<0.016	<0.016	<0.016	0.046	0.026	<0.016	0.072	1130
SD008	5/1/2008	<0.017	<0.017	<0.017	<0.017	0.079	0.047	<0.017	0.125	436000
SD009	5/1/2008	<0.036	<0.036	<0.036	<0.036	1.050	0.913	0.103	2.070	51900
SD010	5/1/2008	<0.037	<0.037	<0.037	<0.037	1.800	1.230	0.127	3.150	50700
SD011	5/1/2008	<0.037	<0.037	<0.037	<0.037	0.545	0.366	0.056	0.968	24800
SD012	5/1/2008	<0.035	<0.035	<0.035	<0.035	0.627	0.405	0.058	1.090	26200
SD013	5/1/2008	<0.040	<0.040	<0.040	<0.040	0.777	0.373	0.068	1.220	33300
SD014	5/1/2008	<0.037	<0.037	<0.037	<0.037	0.439	0.193	<0.037	0.633	20600
SD015	4/30/2008	<0.034	<0.034	<0.034	<0.034	0.451	0.186	<0.034	0.637	19200
SD106	4/30/2008	<0.047	<0.047	<0.047	<0.047	2.160	0.812	0.121	3.100	61800
SD116*	4/30/2008	<0.051	<0.051	<0.051	<0.051	1.920	0.718	0.109	2.740	36400
SD-532	5/2/2008	<0.053	<0.053	<0.053	<0.053	0.210	0.106	<0.053	0.316	23800
SD-535	5/2/2008	<0.057	<0.057	<0.057	<0.057	0.292	0.123	<0.057	0.416	24400
SD641	4/30/2008	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	<0.042	28700
SD-642	5/2/2008	<0.055	<0.055	<0.055	<0.055	0.319	0.113	<0.055	0.432	24400

TOC: Total Organic Carbon

* SD116 is a Duplicate sample of SD106

Table 2. Lake Hartwell OU-2 Study 2008
Corbicula Tissue PCB and Lipid Analysis

Sample Number	Date Sampled	Aroclor Identification and PCB Concentration (µg/g)								Fraction Lipid
		1016	1221	1232	1242	1248	1254	1260	Total PCBs	
C-000	5/28/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.024	<0.019	0.024	1.6
C-001	5/28/2008	<0.190	<0.190	<0.190	<0.190	1.590	0.413	<0.190	2.000	1.4
C-003	5/28/2008	<0.057	<0.057	<0.057	<0.057	0.461	0.307	<0.057	0.767	1.5
C-004	5/1/2008	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	1.7
C-005	5/28/2008	<0.057	<0.057	<0.057	<0.057	0.377	0.374	<0.057	0.750	1.5
C-006	5/28/2008	<0.038	<0.038	<0.038	<0.038	0.334	0.277	<0.038	0.611	1.6
C-007	5/27/2008	<0.038	<0.038	<0.038	<0.038	0.294	0.153	<0.038	0.447	1.3
C-008	5/27/2008	<0.038	<0.038	<0.038	<0.038	0.399	0.238	<0.038	0.637	1.4
C-009	5/27/2008	<0.038	<0.038	<0.038	<0.038	0.465	0.270	<0.038	0.734	0.76
C-010	5/27/2008	<0.038	<0.038	<0.038	<0.038	0.494	0.307	<0.038	0.800	1.3
C-011	5/27/2008	<0.038	<0.038	<0.038	<0.038	0.241	0.131	<0.038	0.372	1.4
Lake Reference	5/28/2008	<0.019	<0.019	<0.019	<0.019	0.020	0.028	<0.019	0.048	1.7

Lipid Normalized PCB Concentrations 2004-2008

Lipid Normalized PCB Concentration (ug/g)						Tissue PCB Concentration (ug/g)					
Station	2004	2005	2006	2007	2008	Station	2004	2005	2006	2007	2008
C-0	4.63	6.80	NA	5.21	1.488	C-0	0.08	0.11	0.03	0.05	0.024
C-1	62.80	43.20	16.70	127.30	142.857	C-1	1.20	0.67	0.29	0.94	2.000
C-3	100.00	23.20	20.00	185.71	51.133	C-3	1.96	0.40	0.26	1.30	0.767
C-4	ND	ND	ND	ND	ND	C-4	ND	ND	ND	ND	ND
C-5	31.80	57.00	17.20	147.37	50.000	C-5	0.90	0.79	0.26	1.035d	0.750
C-6	67.50	21.10	10.50	NA	38.188	C-6	1.54	0.31	0.16	NA	0.611
C-7	43.40	32.70	40.00	152.78	34.385	C-7	0.83	0.49	0.56	1.10	0.447
C-8	14.30	27.50	31.90	92.00	45.500	C-8	0.58	0.46	0.55	0.46	0.637
C-9	74.70	38.40	43.50	160.42	96.579	C-9	0.91	0.68	0.60	0.77	0.734
C-10	70.50	32.70	35.30	136.67	61.538	C-10	1.50	0.37	0.48	0.41	0.800
C-11	6.60	14.70	11.05	27.78	26.571	C-11	0.19	0.22	0.19	0.20	0.372
Lake Ref	ND	8.60	ND	ND	2.800	Lake Ref	0.03	0.11	ND	ND	0.048
(Average)	**47.62**	**27.81**	**25.13**	**115.03**	**50.09**	(Average)	**0.88**	**0.42**	**0.34**	**0.65**	**0.65**

NA: not analyzed
ND: not detected
d:duplicate

Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV107-01	4/14/2009	LB	395	764	F	5.51	0.64	860.938
SV107-02	4/14/2009	LB	382	696	M	4.41	4.70	93.830
SV107-03	4/14/2009	LB	374	716	M	6.79	3.30	205.758
SV107-04	4/14/2009	LB	395	836	F	8.79	3.80	231.316
SV107-05	4/14/2009	LB	395	784	M	8.38	6.70	125.075
SV107-05 DUP	4/14/2009	LB	395	784	M	8.08	6.40	126.250
SV107-06	4/14/2009	LB	395	704	F	3.85	1.50	256.667
SV107-07	4/14/2009	LB	390	680	F	8.31	1.40	593.571
SV107-08	4/14/2009	LB	420	880	F	9.73	0.46	2115.217
SV107-09	4/14/2009	CC	440	768	F	2.56	0.94	272.340
SV107-10	4/14/2009	CC	420	626	M	4.96	0.44	1127.273
SV107-11	4/14/2009	CC	500	1098	F	1.72	0.58	296.552
SV107-11 DUP	4/14/2009	CC	500	1098	F		0.64	
SV107-12	4/14/2009	CC	440	738	F	2.21	2.30	96.087
SV107-13	4/14/2009	TS	90-110	57	NA	1.79	4.10	43.659
SV107-14	4/14/2009	TS	70-85	46	NA	2.26	3.80	59.474
SV107-15	4/14/2009	TS	80-90	51	NA	3.14	3.10	101.290
SV107-16	4/14/2009	TS	70-90	32	NA	2.04	2.10	97.143
SV107-17	4/14/2009	BG	140-150	187	NA	3.35	1.20	279.167
SV107-18	4/14/2009	BG	120-130	117	NA	1.98	0.84	235.714
SV107-19	4/14/2009	BG	115-125	88	NA	6.46	0.74	872.973
SV107-20	4/14/2009	BG	110	103	NA	1.85	1.10	168.182
SV107-21	4/14/2009	HB	450	1132	M	2.00	10.50	19.048
SV107-22	4/14/2009	HB	465	1260	M	3.45	10.30	33.495
SV107-23	4/14/2009	HB	460	1234	M	3.42	6.00	57.000
SV107-24	4/14/2009	GS	330-350	936	NA	3.78	5.00	75.600
SV107-25	4/14/2009	GS	250-270	720	NA	3.88	3.10	125.161
SV107-26	4/14/2009	GS	300-320	1094	NA	0.31	3.10	10.000
SV107-27	4/14/2009	GS	250-290	706	NA	4.18	3.10	134.839
SV107-28	4/15/2009	HB	551	2014	M	6.15	9.90	62.121
SV107-29	4/15/2009	HB	447	1094	M			
SV107-30	4/15/2009	HB	488	1720	F	2.24	9.40	23.830
SV107-31	4/15/2009	HB	469	1448	F	5.07	5.90	85.932
SV107-32	4/15/2009	LB	474	1188	F	7.09	0.34	2085.294
SV107-33	4/16/2009	HB	487	1740	F	5.49	9.70	56.598
SV107-34	4/16/2009	HB	474	1424	M	6.62	15.10	43.841
SV107-34 DUP	4/16/2009	HB	474	1424	M		14.60	
SV107-35	4/16/2009	HB	531	2210	F	1.85	6.90	26.812
SV107-36	4/21/2009	HB	580	2032	F	4.39	2.70	162.593
SV107-37	4/23/2009	LB	430	1086	M		6.10	

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U - Unknown
Dup - Duplicate
NA - Not applicable

Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV106-01	4/14/2009	HB	385	782	M	1.94	4.40	44.091
SV106-02	4/14/2009	HB	385	662	M	4.76	1.40	340.000
SV106-03	4/14/2009	CC	390	654	F	2.87	0.86	333.721
SV106-04	4/14/2009	CC	385	646	F	0.82	0.50	164.000
SV106-05	4/14/2009	LB	435	1054	M	3.60	5.20	69.231
SV106-05 DUP	4/14/2009		435	1054	M			
SV106-06	4/14/2009	LB	380	630	M	2.59	4.80	53.958
SV106-07	4/14/2009	LB	370	668	F	1.26	0.50	252.000
SV106-08	4/14/2009	LB	400	796	F	4.80	0.74	648.649
SV106-09	4/14/2009	LB	440	976	F	2.55	3.80	67.105
SV106-10	4/14/2009	LB	370	646	M	6.03	5.20	115.962
SV106-11	4/14/2009	LB	530	2064	M	2.18	6.30	34.603
SV106-12	4/15/2009	LB	486	1658	F	3.53	9.30	37.957
SV106-13	4/15/2009	LB	536	1794	F	6.24	8.40	74.286
SV106-14 HOLD	4/15/2009	HB	443	1090	M			
SV106-15 HOLD	4/16/2009	HB	682	3530	F			
SV106-16	4/16/2009	HB	537	1984	M	9.58	1.20	798.333
SV106-17 HOLD	4/16/2009	HB	459	1122	M			
SV106-18 HOLD	4/16/2009	CC	405	584	M			
SV106-19	4/16/2009	HB	489	846	M	2.31	9.80	23.571
SV106-19 DUP	4/16/2009	HB	489	846	M			
SV106-20	4/17/2009	LB	575	2330	M	3.85	10.90	35.321
SV106-21	4/17/2009	HB	572	1820	M	2.22	9.10	24.396
SV106-22 HOLD	4/21/2009	HB	458	1382	M			
SV106-23 HOLD	4/21/2009	HB	473	1400	M			
SV106-24 HOLD	4/21/2009	CC	421	646	M			
SV106-25 HOLD	4/21/2009	CC	474	896	M			
SV106-26	4/23/2009	CC	470	1306	M		10.00	
SV106-27	4/23/2009	CC	460	886	M		1.30	
SV106-28	4/23/2009	CC	410	656	M			
SV106-29	4/24/2009	HB	605	2660	F			

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BG - Bluegill

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M - Male
U - Unknown
Dup - Duplicate
NA - Not applicable

Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV532-01	4/14/2009	LB	465	1134	F	0.60	0.82	73.659
SV532-02	4/14/2009	LB	435	906	M	0.89	0.96	92.188
SV532-03	4/14/2009	LB	365	626	M	0.69	2.30	29.913
SV532-04	4/14/2009	LB	410	854	M	1.49	4.00	37.250
SV532-05	4/14/2009	LB	380	615	F	0.21	0.60	35.000
SV532-06	4/14/2009	LB	360	600	M	0.68	5.00	13.680
SV532-07	4/14/2009	LB	390	674	F	0.43	1.00	42.900
SV532-08	4/14/2009	LB	395	940	M	1.22	4.10	29.756
SV532-09	4/14/2009	LB	455	1034	F	0.52	0.64	80.625
SV532-10	4/14/2009	LB	430	766	F	0.73	0.30	243.000
SV532-11	4/14/2009	CC	520	1160	F	0.30	2.00	14.750
SV532-12 HOLD	4/14/2009	HB	690	3400	F			
SV532-13	4/14/2009	CC	290-340	1100	NA	1.00	4.70	21.213
SV532-13 DUP	4/14/2009	CC	290-340	1100	NA		4.20	
SV532-14	4/14/2009	CC	130-140	150	NA	0.83	1.90	43.421
SV532-15	4/14/2009	BG	115-120	104	NA	0.19	2.70	7.111
SV532-16	4/14/2009	BG	170-190	36	NA	0.37	2.90	12.690
SV532-17	4/14/2009	BG	170-190	74	NA	0.40	2.20	18.136
SV532-18	4/14/2009	BG	170-190	84	NA	0.09	2.20	4.009
SV532-19	4/14/2009	TF	170-190	70	NA	0.94	2.10	44.524
SV532-20	4/14/2009	TF	420	708	F	0.29	0.60	48.833
SV532-21	4/14/2009	HB	405	560	F	2.67	1.50	178.000
SV532-22	4/14/2009	HB	120-140	152	NA	2.29	2.20	104.091
SV532-23	4/14/2009	HB	125-120	120	NA	3.86	2.20	175.455
SV532-24	4/14/2009	GS	290-330	1738	NA	3.53	2.90	121.724
SV532-25	4/15/2009	GS	487	1688	F	3.25	8.90	36.517
SV532-26	4/15/2009	GS	508	1686	M	5.39	12.70	42.441
SV532-27	4/15/2009	GS	461	1224	F	3.58	10.40	34.423
SV532-28	4/15/2009	HB	480	1572	F	3.14	7.30	43.014
SV532-29	4/15/2009	HB	473	1368	F	2.66	7.70	34.545
SV532-30	4/15/2009	HB	467	1530	F	6.26	7.50	83.467
SV532-31	4/15/2009	TF	238-263	752	NA	0.27	4.40	6.091
SV532-32	4/15/2009	TF	308-346	1576	NA	0.14	3.90	3.513
SV532-33	4/15/2009	HB	418	658	M	1.31	0.66	198.485
SV532-34 HOLD	4/16/2009	HB	433	1036	M			
SV532-35	4/16/2009	HB	469	1482	F	2.76	9.80	28.163
SV532-36	4/17/2009	HB	480	1490	F	2.27	7.40	30.676

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NA - Not applicable

Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV535-01	4/14/2009	LB	410	790	F	0.38	2.80	13.643
SV535-02	4/14/2009	CC	490	1020	F	2.30	2.90	79.310
SV535-03	4/14/2009	CC	395	6010	M	1.30	5.30	24.528
SV535-04	4/14/2009	CC	430	610	F	1.79	3.40	52.647
SV535-05	4/14/2009	CC	410	580	F	0.97	3.30	29.394
SV535-06	4/14/2009	HB	490	1380	F	5.79	6.40	90.469
SV535-07	4/15/2009	LB	429	984	M	1.44	0.34	423.529
SV535-08	4/15/2009	LB	375	652	M	1.35	1.20	112.500
SV535-09	4/15/2009	LB	432	1012	F	1.78	6.00	29.667
SV535-10	4/15/2009	LB	432	1032	M	0.03	3.70	0.846
SV535-11	4/15/2009	LB	411	878	M	2.14	1.40	152.857
SV535-12	4/15/2009	LB	385	850	M	0.67	3.80	17.711
SV535-13	4/15/2009	LB	452	1384	F	0.57	6.40	8.938
SV535-14	4/15/2009	LB	443	1220	F	1.50	0.47	319.149
SV535-15	4/15/2009	LB	406	798	F	0.51	1.40	36.643
SV535-16	4/15/2009	HB	463	1288	M	1.71	14.20	12.042
SV535-17	4/15/2009	HB	496	1458	M	0.18	12.70	1.402
SV535-17 DUP	4/15/2009	HB	496	1458	M		11.90	
SV535-18	4/15/2009	HB	456	1322	F	0.56	5.40	10.426
SV535-19	4/15/2009	HB	471	1462	F	0.41	8.90	4.596
SV535-20	4/16/2009	HB	563	2678	F	3.62	4.80	75.417
SV535-21	4/16/2009	HB	1163	1390	F	3.04	6.40	47.500
SV535-22	4/17/2009	HB	542	2086	F	0.66	6.90	9.522
SV535-23	4/17/2009	HB	551	2222	F	7.79	5.00	155.800
SV535-24	4/17/2009	HB	473	1578	F	0.06	7.10	0.854

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NA - Not applicable

Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV642-01	4/15/2009	LB	398	876	M	0.18	6.30	2.921
SV642-02	4/15/2009	LB	402	626	F	0.07	0.50	13.360
SV642-03	4/15/2009	LB	372	602	F	0.08	1.10	6.864
SV642-04	4/15/2009	LB	440	922	F	0.12	0.58	21.207
SV642-05	4/15/2009	LB	399	796	F	0.04	0.46	8.522
SV642-06	4/15/2009	LB	386	694	M	0.03	1.50	1.767
SV642-07	4/15/2009	LB	366	590	F	0.02	1.10	1.736
SV642-08	4/15/2009	LB	425	1038	M	0.03	3.20	0.847
SV642-09	4/15/2009	LB	373	642	F	0.06	0.84	7.250
SV642-10	4/15/2009	LB	392	662	F	0.12	0.82	14.634
SV642-11	4/17/2009	HB	459	1284	F	5.77	7.70	74.935
SV642-12	4/17/2009	HB	486	1320	M	1.15	9.40	12.234
SV642-13	4/17/2009	HB	551	2530	F	4.70	6.00	78.333
SV642-14	4/17/2009	HB	458	1230	F	0.07	8.00	0.886
SV642-15	4/17/2009	HB	459	1280	F	0.11	9.10	1.198
SV642-16	4/17/2009	HB	543	2270	F	0.12	6.30	1.825
SV642-17	4/17/2009	HB	498	1770	F	0.93	8.00	11.563
SV642-18 HOLD	4/17/2009	CC	558	558	F	4.58	5.50	83.273
SV642-19	4/17/2009	CC	485	934	F	0.03	1.60	1.663
SV642-20	4/21/2009	CC	532	2196	F	0.99	3.50	28.314
SV642-21	4/21/2009	HB	471	1578	F	5.38	9.20	58.478
SV642-22	4/21/2009	HB	505	2028	M	0.32	7.00	4.543
SV642-23 HOLD	4/21/2009	HB	492	1848	F	2.09	7.50	27.867
SV642-24	4/21/2009	CC	404	588	F	0.66	2.40	27.292
SV642-25	4/21/2009	CC	445	756	M	0.66	1.80	36.389
SV642-26	4/21/2009	CC	458	1110	M	0.66	1.30	50.385

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Table 3. Fish Field Data and Total PCB Results - Spring 2008

Sample Number	Date	Species	Length (mm)	Weight (grams)	Sex	Total PCB (ppm)	Percent Lipid	Lipid Normal ug PCB/g Lipid
SV641-01	4/16/2009	BG	126-145	186	NA	0.25	2.10	11.810
SV641-02	4/16/2009	BG	110-121	122	NA	1.89	7.50	25.200
SV641-03	4/16/2009	BG	99-118	94	NA	0.25	1.80	13.722
SV641-04	4/16/2009	BG	94-101	62	NA	0.79	2.10	37.714
SV641-05	4/16/2009	TS	12-150	124	NA	0.09	5.40	1.693
SV641-06	4/16/2009	LB	443	944	F	0.15	0.50	30.200
SV641-07	4/16/2009	LB	443	926	F	0.18	0.42	42.619
SV641-08	4/16/2009	LB	447	1000	F	0.27	0.84	31.905
SV641-09	4/16/2009	LB	478	1386	F	0.25	4.80	5.125
SV641-10	4/16/2009	LB	517	1368	F	0.05	0.25	21.960
SV641-11	4/16/2009	LB	416	920	M	0.10	0.98	10.408
SV641-12	4/16/2009	LB	386	674	M	0.26	0.98	26.531
SV641-13	4/16/2009	LB	368	552	F	0.31	4.10	7.463
SV641-14	4/16/2009	LB	396	614	M	0.07	0.28	24.143
SV641-15	4/16/2009	LB	372	564	M	0.09	0.72	12.736
SV641-16	4/17/2009	HB	486	1354	F	0.14	9.50	1.495
SV641-17	4/17/2009	GS	281-350	1140	NA	0.06	3.30	1.952
SV641-18	4/17/2009	GS	225-240	540	NA	0.04	4.60	0.967
SV641-19	4/21/2009	HB	442	1340	M	4.85	11.70	41.453
SV641-20	4/21/2009	HB	522	2174	F	2.15	6.60	32.576
SV641-21	4/21/2009	HB	571	2250	M	0.07	5.40	1.296
SV641-22	4/21/2009	HB	595	2650	F	0.02	2.10	0.910
SV641-23	4/23/2009	CC	420	652	F	0.02	1.00	1.900
SV641-24	4/23/2009	CC	480	1048	F	0.02	0.86	2.209
SV641-25	4/23/2009	GS	245-260	744	NA	0.02	3.40	0.559
SV641-26	4/23/2009	GS	320	800	NA	0.03	2.90	1.100
SV641-27	4/23/2009	TS	75-85	40	NA		3.70	
SV641-28	4/23/2009	TS	120-140	75	NA	0.17	5.30	3.189
SV641-29	4/24/2009	HB	580	2616	M		7.20	
SV641-29 DUP	4/24/2009	HB	580	2616	M		8.00	
SV641-30	4/24/2009	CC	400	575	F	2.90	2.70	107.407
SV641-31	4/24/2009	CC	430	810	F	2.23	4.20	53.095
SV641-32	5/21/2009	HB	470	1440	M	0.15	0.18	82.778
SV641-33	5/21/2009	HB	470	1438	M	0.23	0.14	166.429
SV641-34	5/21/2009	HB	440	1220	F	2.27	4.20	54.048
SV641-35	5/21/2009	HB	440	1225	F	0.37	2.20	17.000

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NA - Not applicable

Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV107-01	LB	4/15/2008	<0.570	<0.570	<0.570	<0.570	2.450	3.060	<0.570	5.510	3.10
SV107-02	LB	4/15/2008	<0.570	<0.570	<0.570	<0.570	2.000	2.420	<0.570	4.410	2.00
SV107-03	LB	4/15/2008	<0.950	<0.950	<0.950	<0.950	3.010	3.790	<0.950	6.790	4.00
SV107-04	LB	4/15/2008	<0.570	<0.570	<0.570	<0.570	3.930	4.860	<0.570	8.790	4.10
SV107-05	LB	4/15/2008	<0.950	<0.950	<0.950	<0.950	3.470	4.910	<0.950	8.380	2.10
SV107-05 DUP	LB	4/15/2008	<0.380	<0.380	<0.380	<0.380	3.230	4.850	<0.380	8.080	1.60
SV107-06	LB	4/15/2008	<0.380	<0.380	<0.380	<0.380	1.840	2.010	<0.380	3.850	2.10
SV107-07	LB	4/15/2008	<0.570	<0.570	<0.570	<0.570	3.280	4.340	0.680	8.310	2.70
SV107-08	LB	4/15/2008	<0.570	<0.570	<0.570	<0.570	3.950	5.150	0.626	9.730	3.00
SV107-09	LB	4/15/2008	<0.380	<0.380	<0.380	<0.380	1.140	1.420	<0.380	2.560	1.80
SV107-10	LB	4/15/2008	<0.380	<0.380	<0.380	<0.380	2.390	2.560	<0.380	4.960	3.00
SV107-11	BG	4/15/2008	<0.190	<0.190	<0.190	<0.190	0.587	1.140	<0.190	1.720	1.00
SV107-12	BG	4/15/2008	<0.152	<0.152	<0.152	<0.152	0.729	1.280	0.206	2.210	1.20
SV107-13	BG	4/15/2008	<0.285	<0.285	<0.285	<0.285	0.629	1.160	<0.285	1.790	0.87
SV107-14	BG	4/15/2008	<0.095	<0.095	<0.095	<0.095	0.681	1.380	0.198	2.260	0.94
SV107-15	TS	4/15/2008	<0.285	<0.285	<0.285	<0.285	1.120	2.030	<0.285	3.140	1.40
SV107-16	TS	4/15/2008	<0.190	<0.190	<0.190	<0.190	0.580	1.240	0.213	2.040	1.40
SV107-17	TS	4/15/2008	<0.253	<0.253	<0.253	<0.253	1.210	1.880	0.261	3.350	1.80
SV107-18	TS	4/15/2008	<0.065	<0.065	<0.065	<0.065	0.658	1.140	0.177	1.980	1.40
SV107-19	HB	4/15/2008	<0.570	<0.570	<0.570	<0.570	3.230	3.230	<0.570	6.460	8.40
SV107-20	HB	4/15/2008	<0.057	<0.057	<0.057	<0.057	0.750	0.976	0.123	1.850	3.60
SV107-21	HB	4/16/2008	<0.190	<0.190	<0.190	<0.190	0.970	1.030	<0.190	2.000	6.80
SV107-22	HB	4/16/2008	<0.190	<0.190	<0.190	<0.190	1.450	1.720	0.280	3.450	5.90
SV107-23	HB	4/16/2008	<0.190	<0.190	<0.190	<0.190	1.490	1.720	0.220	3.420	8.30
SV107-24	HB	4/16/2008	<0.190	<0.190	<0.190	<0.190	1.740	1.810	0.223	3.780	5.40
SV107-24 DUP	HB	4/16/2008	<0.380	<0.380	<0.380	<0.380	2.120	2.160	<0.380	4.280	6.50
SV107-25	CC	4/16/2008	<0.380	<0.380	<0.380	<0.380	1.400	2.080	0.396	3.880	2.50
SV107-26	HB	4/17/2008	<0.019	<0.019	<0.019	<0.019	0.047	0.143	0.120	0.310	8.60
SV107-27	HB	4/17/2008	<0.152	<0.152	<0.152	<0.152	1.760	2.140	0.277	4.180	8.60
SV107-28	HB	4/17/2008	<0.190	<0.190	<0.190	<0.190	3.020	2.800	0.341	6.150	8.60
SV107-29	HB	4/17/2008	<0.057	<0.057	<0.057	<0.057	0.797	1.010	0.172	1.980	3.90
SV107-30	CC	4/17/2008	<0.057	<0.057	<0.057	<0.057	0.995	1.110	0.139	2.240	1.40
SV107-31	GS	4/17/2008	<0.285	<0.285	<0.285	<0.285	2.160	2.460	0.454	5.070	4.70
SV107-31 DUP	GS	4/17/2008	<0.190	<0.190	<0.190	<0.190	2.100	2.470	0.444	5.010	4.10
SV107-32	GS	5/1/2008	<0.380	<0.380	<0.380	<0.380	3.120	3.340	0.631	7.090	4.30
SV107-33	GS	5/1/2008	<0.285	<0.285	<0.285	<0.285	2.470	2.440	0.581	5.490	4.00
SV107-34	GS	5/1/2008	<0.380	<0.380	<0.380	<0.380	3.180	2.950	0.497	6.620	3.90
SV107-35	CC	5/2/2008	<0.057	<0.057	<0.057	<0.057	0.791	0.939	0.119	1.850	1.90
SV107-36	CC	5/27/2008	<0.380	<0.380	<0.380	<0.380	1.780	2.610	<0.380	4.390	0.76

LB - Largemouth Bass
HB - Hybrid Bass
CC - Catfish
GS - Gizzard Shad

BG - Bluegill
TS - Threadfin Shad
< - Indicates an undetected value
Dup - Duplicate

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Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV106-01	HB	04/15/2008	<0.057	<0.057	<0.057	<0.057	0.931	0.897	0.112	1.940	6.20
SV106-02	HB	04/15/2008	<0.190	<0.190	<0.190	<0.190	2.120	2.390	0.250	4.760	5.50
SV106-03	CC	4/15/2008	<0.285	<0.285	<0.285	<0.285	1.020	1.440	0.404	2.870	1.50
SV106-04	CC	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.178	0.408	0.235	0.820	0.52
SV106-05	LB	4/15/2008	<0.380	<0.380	<0.380	<0.380	1.450	1.760	0.390	3.600	3.80
SV106-06	LB	4/15/2008	<0.285	<0.285	<0.285	<0.285	0.713	1.490	0.388	2.590	1.60
SV106-07	LB	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.290	0.585	0.384	1.260	0.78
SV106-08	LB	04/15/2008	<0.190	<0.190	<0.190	<0.190	1.660	2.680	0.453	4.800	2.30
SV106-08 DUP	LB	04/15/2008	<0.190	<0.190	<0.190	<0.190	1.400	2.310	0.406	4.120	2.10
SV106-09	LB	04/15/2008	<0.095	<0.095	<0.095	<0.095	0.512	1.100	0.942	2.550	1.30
SV106-10	LB	04/15/2008	<0.380	<0.380	<0.380	<0.380	2.320	3.160	0.552	6.030	5.20
SV106-11	LB	04/15/2008	<0.095	<0.095	<0.095	<0.095	0.575	1.180	0.428	2.180	1.00
SV106-12	LB	04/15/2008	<0.190	<0.190	<0.190	<0.190	1.370	1.860	0.298	3.530	2.50
SV106-13	LB	04/15/2008	<0.380	<0.380	<0.380	<0.380	2.580	3.170	0.488	6.240	4.20
SV106-14	HB	04/16/2008	<0.950	<0.950	<0.950	<0.950	4.860	5.390	<0.950	10.300	10.20
SV106-15	HB	04/16/2008	<0.380	<0.380	<0.380	<0.380	2.700	3.290	0.399	6.400	9.80
SV106-16	HB	04/16/2008	<0.950	<0.950	<0.950	<0.950	4.700	4.880	<0.950	9.580	8.40
SV106-17	HB	04/17/2008	<0.095	<0.095	<0.095	<0.095	1.440	1.560	0.193	3.190	8.60
SV106-18	HB	04/17/2008	<0.076	<0.076	<0.076	<0.076	1.050	1.320	0.179	2.550	7.60
SV106-19	HB	04/18/2008	<0.190	<0.190	<0.190	<0.190	1.210	1.100	<0.190	2.310	10.00
SV106-20	LB	05/01/2008	<0.285	<0.285	<0.285	<0.285	1.040	2.230	0.574	3.850	2.30
SV106-20 DUP	LB	05/01/2008	<0.285	<0.285	<0.285	<0.285	1.320	2.860	0.734	4.910	1.90
SV106-21	HB	5/1/2008	<0.190	<0.190	<0.190	<0.190	1.060	1.160	<0.190	2.220	4.60
SV106-22	HB	5/1/2008	<0.019	<0.019	<0.019	<0.019	0.133	0.211	0.050	0.395	4.70
SV106-23	CC	5/1/2008	<0.095	<0.095	<0.095	<0.095	0.887	1.130	0.170	2.180	1.70
SV106-24	CC	5/1/2008	<0.095	<0.095	<0.095	<0.095	0.822	1.630	0.347	2.790	1.50

LB - Largemouth Bass	BG - Bluegill
HB - Hybrid Bass	TS - Threadfin Shad
CC - Catfish	< - Indicates an undetected value
GS - Gizzard Shad	Dup - Duplicate

Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV532-01	LB	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.179	0.347	0.079	0.604	1.90
SV532-02	LB	04/15/2008	<0.057	<0.057	<0.057	<0.057	0.295	0.484	0.106	0.885	1.70
SV532-03	LB	04/15/2008	<0.057	<0.057	<0.057	<0.057	0.192	0.391	0.106	0.688	1.20
SV532-04	LB	04/15/2008	<0.057	<0.057	<0.057	<0.057	0.490	0.857	0.144	1.490	2.90
SV532-05	LB	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.047	0.113	0.050	0.210	0.69
SV532-06	LB	04/15/2008	<0.076	<0.076	<0.076	<0.076	0.203	0.386	0.095	0.684	1.80
SV532-07	LB	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.145	0.221	0.063	0.429	3.70
SV532-08	LB	04/15/2008	<0.095	<0.095	<0.095	<0.095	0.417	0.668	0.137	1.220	1.60
SV532-09	LB	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.115	0.315	0.086	0.516	1.70
SV532-09 DUP	LB	04/15/2008	<0.057	<0.057	<0.057	<0.057	<0.057	0.262	0.080	0.342	1.40
SV532-10	LB	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.242	0.409	0.078	0.729	2.00
SV532-11	CC	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.115	0.159	0.021	0.295	1.00
SV532-12	CC	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.205	0.351	0.079	0.634	2.10
SV532-12 DUP	CC	04/16/2008	<0.057	<0.057	<0.057	<0.057	0.215	0.388	<0.057	0.603	1.30
SV532-13	CC	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.315	0.565	0.117	0.997	2.50
SV532-14	CC	04/15/2008	<0.038	<0.038	<0.038	<0.038	0.226	0.477	0.121	0.825	0.78
SV532-15	BG	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.058	0.105	0.029	0.192	0.82
SV532-16	BG	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.114	0.211	0.044	0.368	1.30
SV532-17	BG	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.128	0.233	0.037	0.399	1.00
SV532-18	BG	04/15/2008	<0.019	<0.019	<0.019	<0.019	0.031	0.057	<0.019	0.088	0.98
SV532-19	TF	04/15/2008	<0.022	<0.022	<0.022	<0.022	0.389	0.394	0.153	0.935	2.30
SV532-20	TF	04/15/2008	<0.023	<0.023	<0.023	<0.023	0.053	0.186	0.054	0.293	1.50
SV532-21	HB	04/15/2008	<0.380	<0.380	<0.380	<0.380	1.150	1.520	<0.380	2.670	2.90
SV532-22	HB	04/15/2008	<0.285	<0.285	<0.285	<0.285	1.090	1.210	<0.285	2.290	3.80
SV532-23	HB	04/15/2008	<0.190	<0.190	<0.190	<0.190	1.670	1.900	0.286	3.860	5.00
SV532-24	GS	04/15/2008	<0.095	<0.095	<0.095	<0.095	1.560	1.680	0.295	3.530	7.00
SV532-25	GS	04/15/2008	<0.076	<0.076	<0.076	<0.076	1.360	1.650	0.237	3.250	4.00
SV532-26	GS	04/15/2008	<0.380	<0.380	<0.380	<0.380	2.680	2.710	<0.380	5.390	6.10
SV532-27	GS	04/15/2008	<0.190	<0.190	<0.190	<0.190	1.790	1.540	0.239	3.580	7.40
SV532-28	HB	04/16/2008	<0.190	<0.190	<0.190	<0.190	1.550	1.600	<0.190	3.140	8.20
SV532-29	HB	04/16/2008	<0.190	<0.190	<0.190	<0.190	1.390	1.270	<0.190	2.660	5.20
SV532-30	HB	04/16/2008	<0.380	<0.380	<0.380	<0.380	2.780	3.480	<0.380	6.260	6.90
SV532-31	TF	04/16/2008	<0.019	<0.019	<0.019	<0.019	0.080	0.151	0.037	0.268	1.60
SV532-32	TF	04/16/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.099	0.039	0.137	1.20
SV532-33	HB	04/17/2008	<0.038	<0.038	<0.038	<0.038	0.476	0.723	0.110	1.310	6.90
SV532-34	HB	04/17/2008	<0.095	<0.095	<0.095	<0.095	1.460	1.590	0.210	3.260	7.00
SV532-35	HB	04/17/2008	<0.076	<0.076	<0.076	<0.076	1.200	1.400	0.157	2.760	5.70
SV532-36	HB	04/18/2008	<0.380	<0.380	<0.380	<0.380	1.030	1.240	<0.380	2.270	6.80

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Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV535-01	HB	04/16/2008	<0.038	<0.038	<0.038	<0.038	0.163	0.218	<0.038	0.382	7.00
SV535-02	LB	04/16/2008	<0.190	<0.190	<0.190	<0.190	0.743	1.360	0.204	2.300	2.60
SV535-03	LB	04/16/2008	<0.095	<0.095	<0.095	<0.095	0.389	0.767	0.139	1.300	1.90
SV535-04	LB	04/16/2008	<0.095	<0.095	<0.095	<0.095	0.638	0.973	0.176	1.790	5.00
SV535-05	LB	04/16/2008	<0.076	<0.076	<0.076	<0.076	0.265	0.574	0.132	0.970	1.40
SV535-06	LB	04/16/2008	<0.380	<0.380	<0.380	<0.380	2.230	3.080	0.485	5.790	9.70
SV535-07	LB	04/16/2008	<0.190	<0.190	<0.190	<0.190	0.442	0.994	<0.190	1.440	3.00
SV535-08	LB	04/16/2008	<0.190	<0.190	<0.190	<0.190	0.522	0.831	<0.190	1.350	5.30
SV535-09	LB	04/16/2008	<0.095	<0.095	<0.095	<0.095	0.695	0.937	0.146	1.780	5.20
SV535-10	LB	04/16/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.031	<0.019	0.031	0.32
SV535-11	LB	04/16/2008	<0.190	<0.190	<0.190	<0.190	0.953	1.180	<0.190	2.140	6.80
SV535-12	CC	04/16/2008	<0.057	<0.057	<0.057	<0.057	0.219	0.395	0.060	0.673	1.40
SV535-13	CC	04/16/2008	<0.057	<0.057	<0.057	<0.057	0.258	0.314	<0.057	0.572	1.70
SV535-14	HB	04/17/2008	<0.038	<0.038	<0.038	<0.038	0.467	0.862	0.169	1.500	4.30
SV535-15	HB	04/18/2008	<0.038	<0.038	<0.038	<0.038	0.188	0.268	0.057	0.513	8.40
SV535-16	HB	04/18/2008	<0.095	<0.095	<0.095	<0.095	0.851	0.863	<0.095	1.710	6.20
SV535-17	CC	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.065	0.114	<0.019	0.178	1.10
SV535-18	HB	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.173	0.312	0.078	0.563	6.80
SV535-19	HB	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.160	0.205	0.044	0.409	5.70
SV535-20	HB	04/23/2008	<0.095	<0.095	<0.095	<0.095	1.580	1.800	0.244	3.620	4.40
SV535-21	HB	04/23/2008	<0.095	<0.095	<0.095	<0.095	1.380	1.450	0.215	3.040	4.00
SV535-22	HB	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.203	0.387	0.068	0.657	4.00
SV535-23	HB	04/23/2008	<0.190	<0.190	<0.190	<0.190	3.840	3.540	0.408	7.790	8.60
SV535-24	CC	04/23/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.061	<0.019	0.061	1.60

LB - Largemouth Bass	BG - Bluegill
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Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV642-01	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	0.040	0.105	0.038	0.184	1.70
SV642-02	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.042	0.025	0.067	0.32
SV642-03	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.051	0.025	0.076	0.58
SV642-04	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.090	0.033	0.123	1.50
SV642-05	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.039	<0.019	0.039	0.28
SV642-06	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.027	<0.019	0.027	0.70
SV642-07	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.019	<0.019	0.019	0.52
SV642-08	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.027	<0.019	0.027	0.80
SV642-09	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.042	0.019	0.061	1.80
SV642-10	LB	04/17/2008	<0.019	<0.019	<0.019	<0.019	0.029	0.072	0.019	0.120	1.80
SV642-11	HB	04/23/2008	<0.190	<0.190	<0.190	<0.190	2.640	2.770	0.359	5.770	5.80
SV642-12	HB	04/23/2008	<0.038	<0.038	<0.038	<0.038	0.316	0.699	0.134	1.150	1.80
SV642-12 DUP	HB	04/23/2008	<0.038	<0.038	<0.038	<0.038	0.292	0.589	0.123	1.000	1.70
SV642-13	HB	04/23/2008	<0.190	<0.190	<0.190	<0.190	1.600	2.660	0.442	4.700	1.90
SV642-14	CC	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.024	0.047	<0.019	0.071	2.00
SV642-15	CC	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.037	0.072	<0.019	0.109	2.70
SV642-16	CC	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.044	0.071	<0.019	0.115	1.50
SV642-17	HB	05/02/2008	<0.038	<0.038	<0.038	<0.038	0.292	0.545	0.088	0.925	1.30
SV642-18	HB	04/24/2008	<0.190	<0.190	<0.190	<0.190	2.070	2.510	<0.190	4.580	5.50
SV642-19	CC	04/24/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.027	<0.019	0.027	0.67
SV642-20	HB	05/01/2008	<0.038	<0.038	<0.038	<0.038	0.338	0.578	0.075	0.991	5.90
SV642-21	HB	05/01/2008	<0.380	<0.380	<0.380	<0.380	2.430	2.950	<0.380	5.380	8.90
SV642-22	HB	05/01/2008	<0.019	<0.019	<0.019	<0.019	0.095	0.165	0.058	0.318	5.70
SV642-23	HB	05/02/2008	<0.095	<0.095	<0.095	<0.095	0.789	1.140	0.166	2.090	7.50
SV642-24	HB	05/02/2008	<0.038	<0.038	<0.038	<0.038	0.196	0.390	0.069	0.655	2.40

LB - Largemouth Bass
HB - Hybrid Bass
CC - Catfish
GS - Gizzard Shad
BG - Bluegill
TS - Threadfin Shad
< - Indicates an undetected value
Dup - Duplicate

Table 4. Fish Tissue Aroclor and Total PCB Results - Spring 2008

Sample Number	Species	Date Sampled	Aroclor Identification- ug/g							Total PCB - ug/g	Percent Lipid
			1016	1221	1232	1242	1248	1254	1260		
SV641-01	HB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.068	0.129	0.051	0.248	8.40
SV641-02	HB	04/18/2008	<0.190	<0.190	<0.190	<0.190	0.795	1.100	<0.190	1.890	7.50
SV641-03	HB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.068	0.114	0.065	0.247	8.10
SV641-04	HB	04/18/2008	<0.095	<0.095	<0.095	<0.095	0.339	0.453	<0.095	0.792	4.20
SV641-04 DUP	HB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.314	0.436	0.085	0.835	4.00
SV641-05	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.048	0.044	0.091	0.70
SV641-06	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.024	0.062	0.066	0.151	1.50
SV641-07	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.019	0.085	0.075	0.179	3.00
SV641-08	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.035	0.118	0.115	0.268	7.00
SV641-09	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.031	0.123	0.092	0.246	2.20
SV641-10	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.028	0.027	0.055	1.80
SV641-11	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.047	0.055	0.102	0.98
SV641-12	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.031	0.140	0.089	0.260	3.60
SV641-13	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.072	0.171	0.064	0.306	3.20
SV641-14	LB	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.029	0.039	0.068	0.98
SV641-15	CC	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.022	0.050	0.020	0.092	2.10
SV641-16	CC	04/18/2008	<0.019	<0.019	<0.019	<0.019	0.031	0.080	0.032	0.142	1.80
SV641-17	GS	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.026	0.039	0.064	3.80
SV641-18	GS	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.020	0.025	0.045	2.70
SV641-19	GS	04/18/2008	<0.380	<0.380	<0.380	<0.380	2.080	2.340	0.428	4.850	3.90
SV641-20	GS	04/18/2008	<0.190	<0.190	<0.190	<0.190	0.959	0.883	0.306	2.150	4.20
SV641-20 DUP	GS	04/18/2008	<0.057	<0.057	<0.057	<0.057	0.760	1.160	0.165	2.090	5.50
SV641-21	BG	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.042	0.028	0.070	1.90
SV641-22	BG	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.019	<0.019	0.019	1.00
SV641-23	BG	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	1.20
SV641-24	BG	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	1.20
SV641-25	TF	04/18/2008	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	1.20
SV641-26	TF	04/18/2008	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	<0.032	1.20
SV641-28	HB	04/23/2008	<0.019	<0.019	<0.019	<0.019	0.039	0.077	0.054	0.169	6.30
SV641-30	HB	04/24/2008	<0.190	<0.190	<0.190	<0.190	1.120	1.490	0.286	2.900	4.20
SV641-31	HB	04/24/2008	<0.076	<0.076	<0.076	<0.076	0.954	0.945	0.327	2.230	4.20
SV641-32	CC	04/24/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.093	0.055	0.149	0.18
SV641-33	CC	04/24/2008	<0.019	<0.019	<0.019	<0.019	<0.019	0.161	0.072	0.233	0.14
SV641-34	HB	05/01/2008	<0.190	<0.190	<0.190	<0.190	1.010	1.260	<0.190	2.270	4.20
SV641-35	HB	05/01/2008	<0.019	<0.019	<0.019	<0.019	0.127	0.202	0.045	0.374	2.20
SV641-36	TF	5/27/2008	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	2.20
SV641-37	TF	5/27/2008	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	<0.034	1.50

LB - Largemouth Bass
HB - Hybrid Bass
CC - Catfish
GS - Gizzard Shad
BG - Bluegill
TS - Threadfin Shad
< - Indicates an undetected value
Dup - Duplicate

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Table 5. Lake Hartwell OU2 Fish Study, 2008, Total PCB Concentrations (ppm) in Largemouth Bass

Replicate Number	Station SV-107	SV-106	SV-532	SV-535	SV-641	SV-642
1	5.51	3.60	0.60	2.30	0.09	0.18
2	4.41	4.46	0.89	1.30	0.15	0.07
3	6.79	2.59	0.69	1.79	0.18	0.08
4	8.79	1.26	1.49	0.97	0.27	0.12
5	8.23	2.55	0.21	5.79	0.25	0.04
6	3.85	6.03	0.684	1.44	0.05	0.03
7	8.31	2.18	0.43	1.35	0.10	0.02
8	9.73	3.53	1.22	1.78	0.26	0.03
9	2.56	6.24	0.43	0.03	0.31	0.06
10	4.96	4.38	0.73	2.14	0.07	0.12
Mean	**6.31**	**3.68**	**0.74**	**1.89**	**0.17**	**0.07**
Std. Dev.	**2.40**	**1.63**	**0.38**	**1.51**	**0.09**	**0.05**

*One half of the detection limit is used for the averaging value.

d = duplicate, average of duplicate and value is used for averaging value.

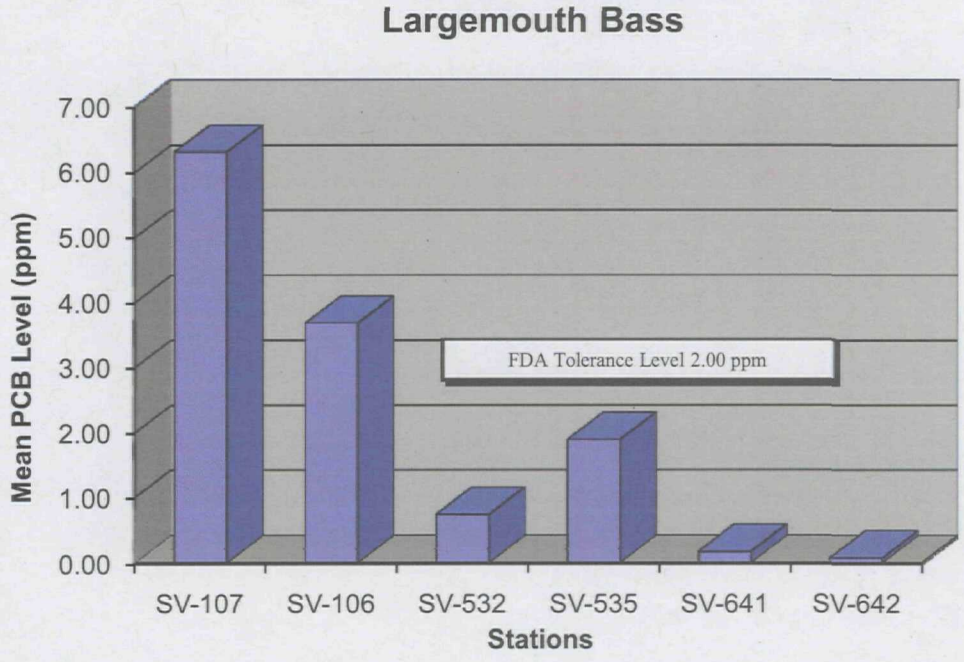

Table 6. Lake Hartwell OU2 Fish Study, 2008, Total PCB Concentrations (ppm) in Hybrid Bass

Replicate	Station					
Number	SV-107	SV-106	SV-532	SV-535	SV-641	SV-642
1	6.46	1.94	2.67	0.38	0.25	5.77
2	1.85	4.76	2.29	1.50	1.89	1.08
3	2.00	10.30	3.86	0.51	0.25	4.70
4	3.45	6.40	3.14	1.71	0.81	0.93
5	3.42	9.58	2.66	0.56	0.17	4.58
6	4.03	3.19	6.26	0.409	2.90	0.99
7	0.31	2.55	1.31	3.62	2.23	5.38
8	4.18	2.31	3.26	3.04	2.27	0.32
9	6.15	2.22	2.76	0.66	0.37	2.09
10	1.98	0.40	2.27	7.79	NA	0.66
Mean	**3.38**	**5.13**	**3.05**	**2.02**	**1.24**	**2.65**
Std. Dev.	**1.94**	**3.31**	**1.32**	**2.33**	**1.08**	**2.19**

*One half of the detection limit is used for the averaging value.

d = duplicate, average of duplicate and value is used for averaging value.

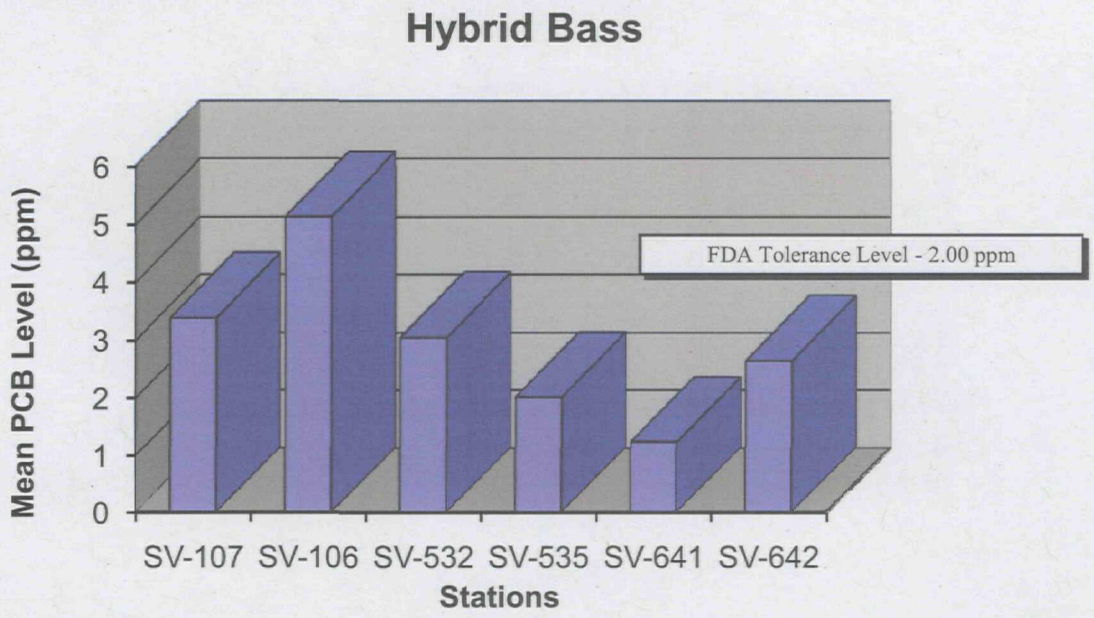

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Table 7. Lake Hartwell OU2 Fish Study, 2008, Total PCB Concentrations (ppm) in Channel Catfish

Replicate Number	Station SV-107	SV-106	SV-532	SV-535	SV-641	SV-642
1	3.88	2.87	0.30	0.67	0.09	0.07
2	2.24	0.82	0.62	0.57	0.14	0.11
3	1.85	2.18	1.00	0.18	0.15	0.12
4	4.39	2.79	0.83	0.06	0.23	0.03
Mean	**3.09**	**2.17**	**0.68**	**0.37**	**0.15**	**0.10**
Std. Dev.	**1.23**	**0.95**	**0.30**	**0.30**	**0.06**	**0.02**

d = The duplicate was accepted based on surragate recovery.

*One half of the detection limit is used for the averaging value.

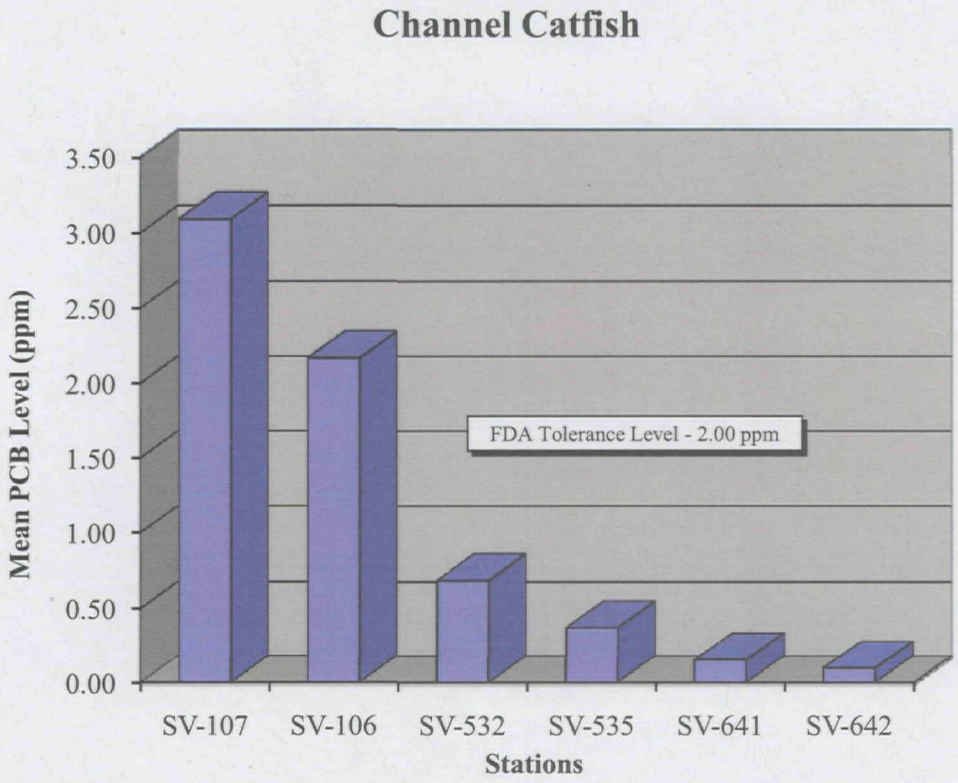


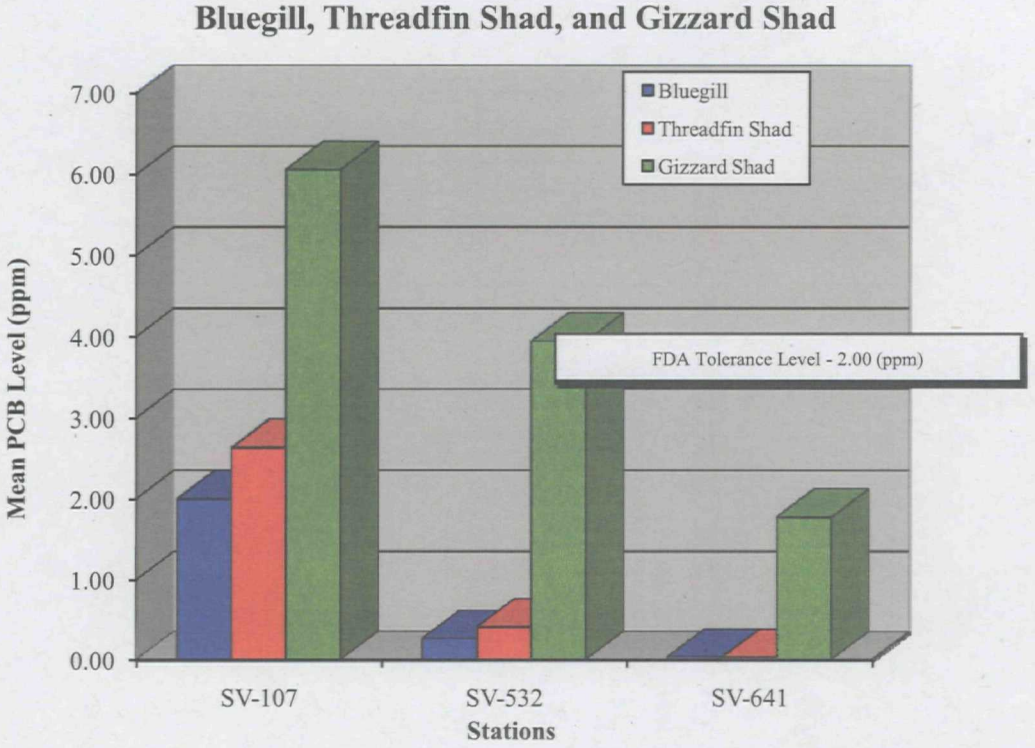
Table 8. Lake Hartwell OU2 Fish Study, 2008, Total PCB Concentrations (ppm) in Bluegill, Threadfin Shad, and Gizzard Shad

	Station		
Species	**SV-107**	**SV-532**	**SV-641**
Bluegill	1.72	0.19	0.07
	2.21	0.37	0.02
	1.79	0.40	0.02
	2.26	0.09	0.02
Threadfin Shad	3.14	0.94	0.02
	2.04	0.29	0.03
	3.35	0.27	0.03
	1.98	0.14	0.03
Gizzard Shad	5.04	3.53	0.0644
	7.09	3.25	0.04
	5.49	5.39	4.85
	6.62	3.58	2.12
Bluegill Mean	**2.00**	**0.26**	**0.03**
Threadfin Shad Mean	**2.63**	**0.41**	**0.03**
Gizzard Shad Mean	**6.06**	**3.94**	**1.77**

d = The duplicate sample was utilized rather than the average, based on surrogate recovery

*One half of the detection limit is used for the averaging value.

NA: not available, NS: not sampled



Appendix C
Five-Year Review
Site Inspection Checklist and Photographs

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Sangamo Weston/Twelve Mile Creek/Lake Hartwell PCB Superfund Site - OU-2	**Date of inspection: 05-06-09**
Location and Region: Pickens, SC, Region 4	**EPA ID:**
Agency, office, or company leading the five-year review: USEPA/SCDHEC	**Weather/temperature: Rainy, 65°**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Sediment, *Corbicula* and Fish Tissue Monitoring
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jim Orr – URS (Name) Consultant (Title) 05/2009 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

Site Inspection Checklist

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA
Contact Craig Zeller — RPM — 05/05/09 — _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

Agency SC DHEC
Contact Greg Cassidy — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

Agency SC DHEC
Contact Chuck Williams — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ — _____ — _____ — _____
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached. Paul Brody, Arcadis, attended site tours.

Site Inspection Checklist

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☐ As-built drawings — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks Documents were maintained on-site

2. **Site-Specific Health and Safety Plan** — ☒ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Contingency plan/emergency response plan — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

3. **O&M and OSHA Training Records** — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

7. **Groundwater Monitoring Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☒ N/A

    Remarks

Site Inspection Checklist

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☒ Other Schlumberger

2. **O&M Cost Records**

☒ Readily available ☐ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From	2005 Date	To	2006 Date	$125,000 Total cost	☐ Breakdown attached
From	2006 Date	To	2007 Date	$141,000 Total cost	☐ Breakdown attached
From	2007 Date	To	2008 Date	$126,000 Total cost	☐ Breakdown attached
From	2008 Date	To	2009 Date	$138,000 Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: Additional costs associated with installation of fish advisory signs ($60,000 +/-)

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☒ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Fish advisory signs installed in April 2009

Site Inspection Checklist

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☒ Yes ☐ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Sediment, Fish Tissue, Corbicula
Frequency Annual
Responsible party/agency USEPA
Contact Craig Zeller (Name) USEPA RPM (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☐ No ☒ N/A
Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Fish tissue consumption advisory signs adequate

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks

2. **Land use changes on site** ☒ N/A
Remarks

3. **Land use changes off site** ☒ N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☒ N/A
Remarks

Site Inspection Checklist

B. Other Site Conditions

Remarks _____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks_____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent_____
   ☐ Ponding ☐ Location shown on site map Areal extent_____
   ☐ Seeps ☐ Location shown on site map Areal extent_____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent_____
   Remarks_____
   _____

Site Inspection Checklist

9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability Areal extent_____ Remarks_____	
B. Benches ☐ Applicable ☐ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay Remarks_____	
2.	**Bench Breached** ☐ Location shown on site map ☐ N/A or okay Remarks_____	
3.	**Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay Remarks_____	
C. Letdown Channels ☐ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** ☐ Location shown on site map ☐ No evidence of settlement Areal extent_____ Depth_____ Remarks_____	
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type_____ Areal extent_____ Remarks_____	
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent_____ Depth_____ Remarks_____	

Site Inspection Checklist

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____

Site Inspection Checklist

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks_____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Areal extent_____ Depth_____ ☐ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks_____

Site Inspection Checklist

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

Site Inspection Checklist

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   - ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   - ☐ Air stripping ☐ Carbon adsorbers
   - ☐ Filters_____
   - ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   - ☐ Others_____
   - ☐ Good condition ☐ Needs Maintenance
   - ☐ Sampling ports properly marked and functional
   - ☐ Sampling/maintenance log displayed and up to date
   - ☐ Equipment properly identified
   - ☐ Quantity of groundwater treated annually_____
   - ☐ Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☐ N/A ☐ Good condition ☐ Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   - ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   - ☐ N/A ☐ Good condition ☐ Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   - ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   - ☐ Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   - ☐ All required wells located ☐ Needs Maintenance ☐ N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   - ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   - ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

Site Inspection Checklist

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The fish consumption advisory remains in effect for OU-2. Continued evidence of monitored natural recovery is observed in sediments. Although tissue concentrations have declined concentrations of PCBs above 1 ppb are still observed in fish and clams.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M procedures adequate. Removal of Woodside and 1 and 2 dams is anticipated to occur in the near future. This will inhance sedimentation in Lake Hartwekk and Twelve Mile Creek.

Site Inspection Checklist

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. Tissue concentrations are unpredictable.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Dam removal is anticipated to optimize remedy.

Photographic Log

Client Name:	Site Location:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)

Photo No.	Date
1	05/06/09

Description
Twelve-Mile Beach (OU-2)
Highway 133 near Clemson.

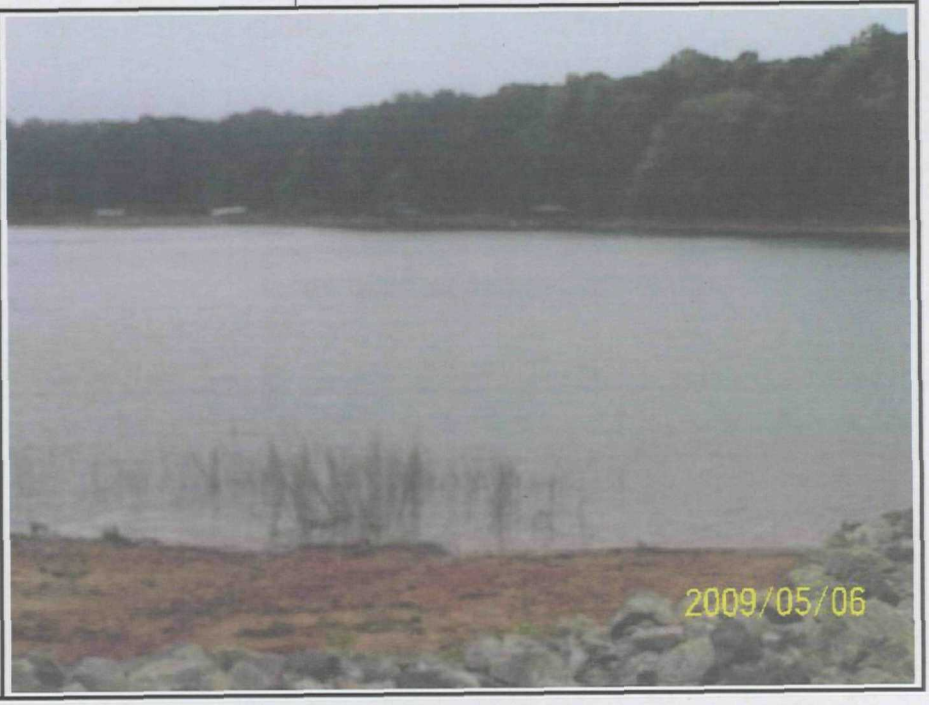


Photo No.	Date
2	05/06/09

Description
Twelve Mile Beach (OU-2)
Posted health advisory signs for fish consumption.

Photographic Log

Client Name:	Site Location:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)

Photo No.	Date
3	05/06/09

Description
Twelve Mile Creek (OU-2)
Madden Bridge Overpass looking upstream.

Photo No.	Date
4	05/06/09

Description
Twelve Mile Creek (OU-2)
Maw Bridge Overpass looking upstream.

Photographic Log

Client Name:	Site Location:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)

Photo No.	Date
5	05/06/09

Description
Twelve Mile Creek (OU-2)
Maw Bridge Overpass looking downstream. Water depth less than 6 inches.

Photo No.	Date
6	05/06/09

Description
Twelve Mile Creek (OU-2)
Maw Bridge Overpass. Water depth less than 6 inches.

Photographic Log

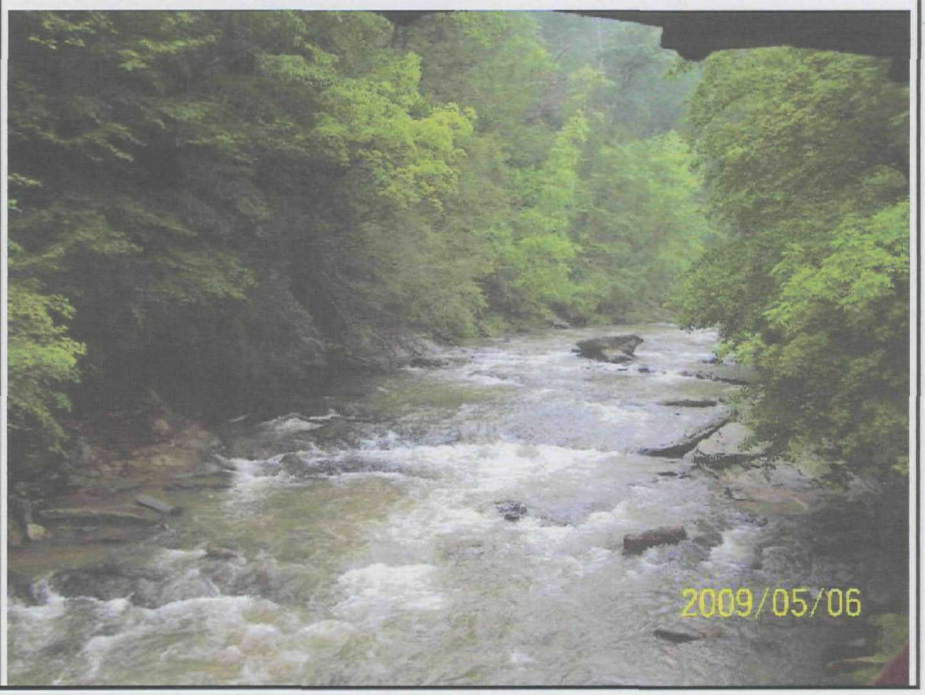
Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
7	05/06/09

Description
Twelve Mile Creek (OU-2)
Lay Bridge Overpass looking downstream.

Photo No.	Date
8	05/06/09

Description
Twelve Mile Creek (OU-2)
Lay Bridge Overpass looking upstream.



Photographic Log

Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
9	05/06/09

Description
Woodside 2 Dam
Sediment overflowing.

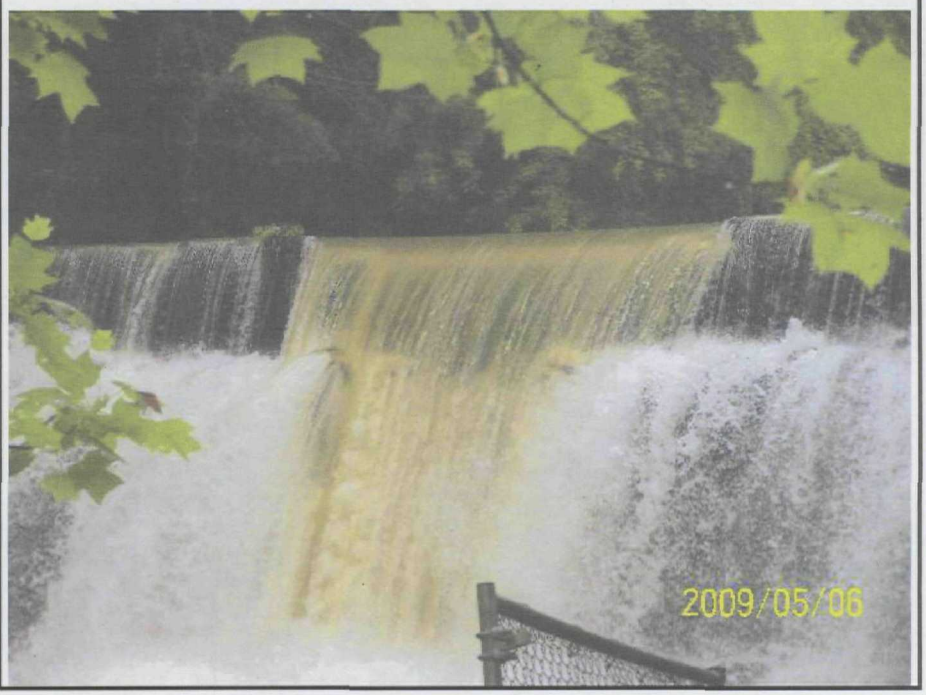
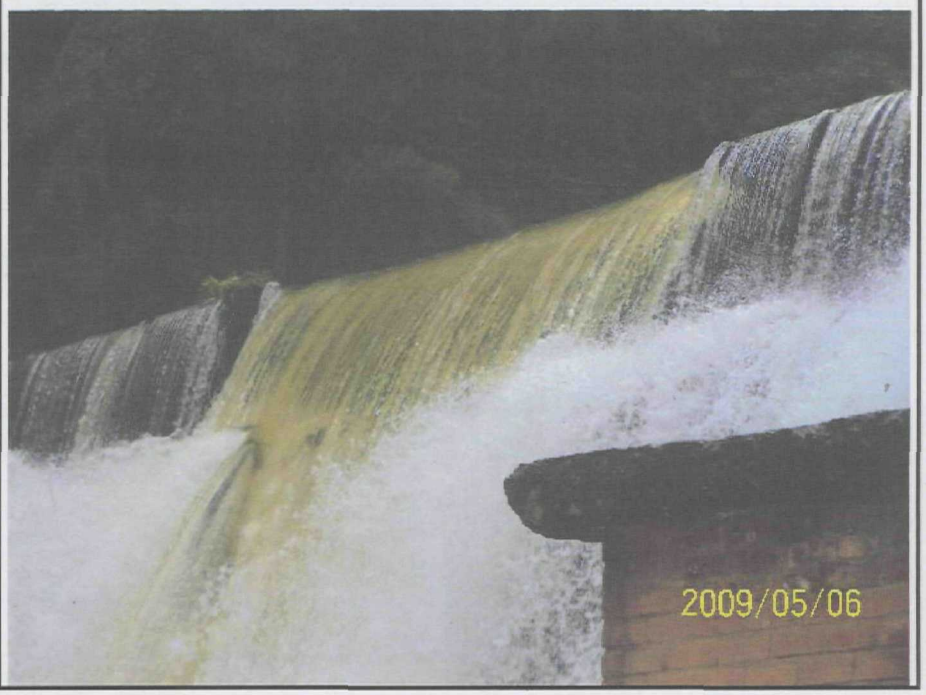


Photo No.	Date
10	05/06/09

Description
Woodside 2 Dam
Sediment overflowing.



Photographic Log

Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
11	05/06/09

Description
Woodside 2 Dam
Water overflowing beside dam.

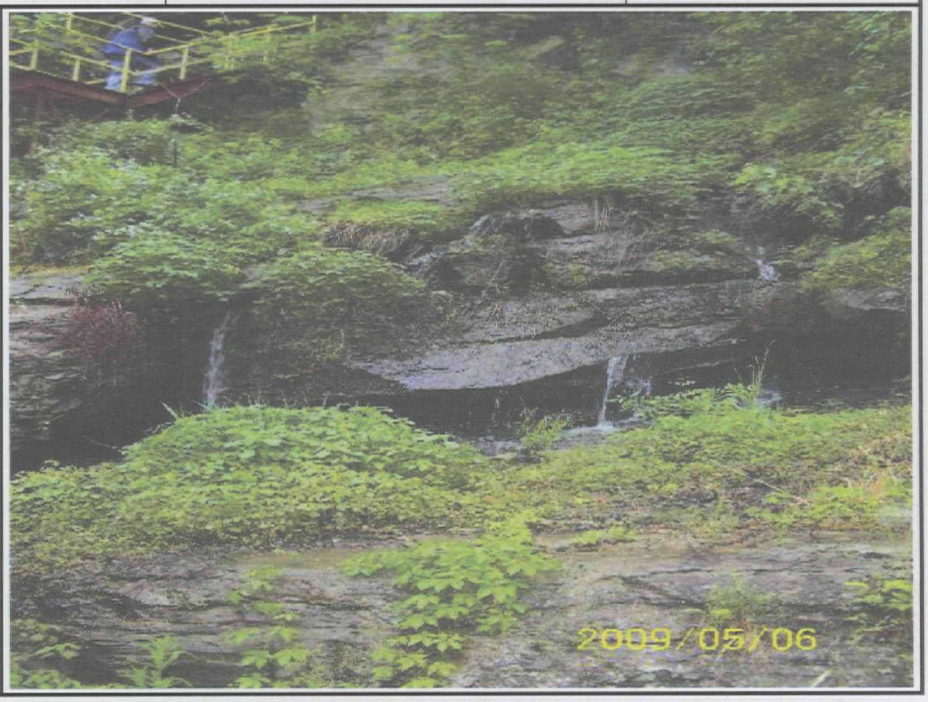
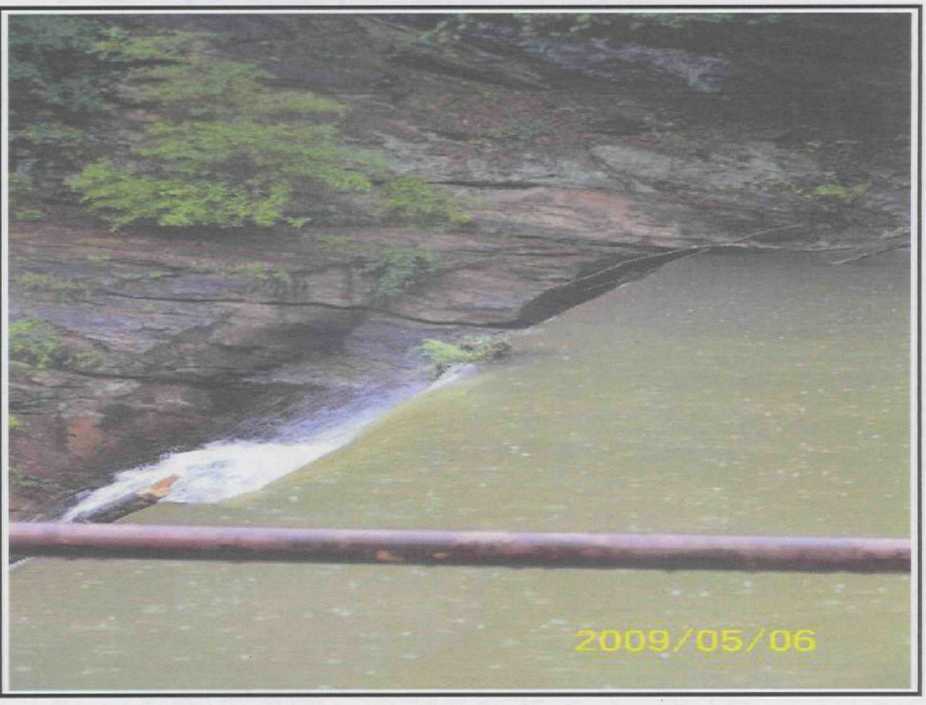


Photo No.	Date
12	05/06/09

Description
Woodside 2 Dam
Top of dam



Photographic Log

Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
13	05/06/09

Description
Woodside 2 Dam
Surface waters behind dam. Water depth less than 12 inches, full of sediment.

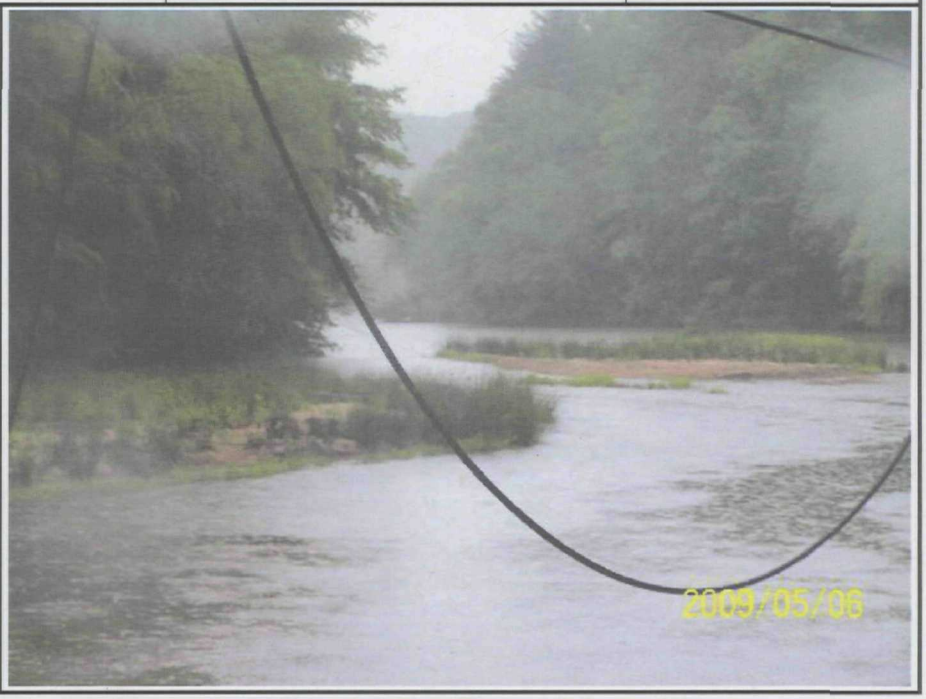


Photo No.	Date
14	05/06/09

Description
Woodside 2 Dam
Close up of sediment overflowing dam.

Photographic Log

Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
15	05/06/09

Description
Woodside 1 Dam
Surface water behind dam, very shallow, full of sediment.

Photo No.	Date
16	05/06/09

Description
Woodside 1 Dam
Top of dam.

Photographic Log

Client Name:	Site Location:	Project No.:
Schlumberger Technology Corporation	Operable Unit Two (OU-2)	00-71238.42

Photo No.	Date
17	05/06/09

Description
Woodside 1 Dam
Surface waters below dam.

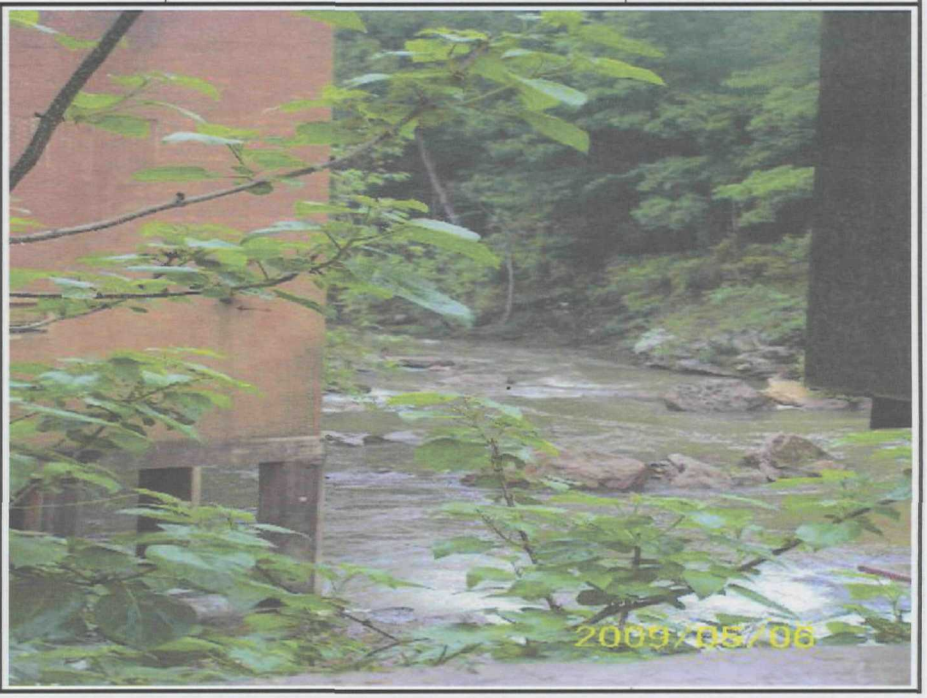


Photo No.	Date
18	05/06/09

Description
Twelve Mile Creek
100 feet upstream of dam, full of sediment.

Appendix D
Copy of Community Notification

4499614

NOTICE

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Announces the
2nd Five-Year Review
For the
Sangamo Weston 12 Mile Creek/Lake Hartwell PCB Contamination Site

The United States Environmental Protection Agency (EPA) Region 4 and the South Carolina Department of Health and Environmental Control (SCDHEC) have initiated the 2nd Five-Year Review for Operable Unit One (OU1) and Operable Unit Two (OU2) of the Sangamo Weston/12 Mile Creek/Lake Hartwell PCB Contamination Superfund Site in Pickens County, South Carolina. Five Year Reviews are conducted to evaluate the protectiveness of cleanup actions taken at Superfund sites.

OU1 of the Sangamo site addressed the land based PCB source areas, including the former Plant site and six satellite disposal areas. Soils impacted by PCBs were excavated from the disposal areas and stockpiled at the Plant site for treatment. From December 1995 through May 1997, approximately 60,000 tons of soil was treated via thermal desorption and backfilled on the Plant site. Active groundwater recovery and treatment was initiated at the Breazeale disposal area and the Plant site in June 1997 and November 1998, respectively. Collectively the two systems have recovered more than 300 million gallons of groundwater, and removed 1,565 pounds of chlorinated solvents and 18 pounds of PCBs. OU2 of the Sangamo site addressed the sediment, surface water, and biological migration pathways down stream from the land-based source areas. A fish consumption advisory on Lake Hartwell was first issued in 1976, and has been modified many times since to provide meal advice to anglers based on PCB trends in fish tissue. Impacted surface sediments in the 12 Mile Creek Arm of Lake Hartwell are being addressed by natural burial processes referred to as Monitored Natural Recovery.

EPA and SCDHEC anticipate that the 2nd Five Year Review for the Sangamo site will be completed by July 2009. Public comments and questions on the Five Year Review process are encouraged. For more information on the Sangamo site, please visit the EPA web page at www.epa.gov/region4/waste/npl/nplsc/ or contact the EPA/SCDHEC project managers below:

Craig Zeller, P.E.
US EPA Region 4
Superfund Division
61 Forsyth Street
Atlanta, GA 30303
404.562.8827
Zeller.Craig@epa.gov
Greg Cassidy
SCDHEC
2600 Bull Street
Columbia, SC 29201
803.896.4178
CASSIDGA@dhec.sc.gov